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ANNUAL REPORT

OF THE

CANAL COMMISSIONERS,

OF THE

STATE OF NEW YORK.

TRANSMITTED TO THE LEGISLATURE JANUARY 8, 1862.



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State of New York.

No. 9.

IN ASSEMBLY,

January 8, 1862.

ANNUAL REPORT OF THE CANAL COMMISSIONERS.

STATE OF NEW YORK:
CANAL COMMISSIONERS' OFFICE,
ALBANY, December 31st, 1861. }

To the Honorable the Legislature of the State of New York :

The undersigned herewith transmit their respective reports, as Canal Commissioners, for the year 1861.

Very respectfully,

H. GARDNER,
B. F. BRUCE,
W. I. SKINNER,
Canal Commissioners.

REPORT.

STATE OF NEW YORK:

CANAL COMMISSIONERS' OFFICE,
ALBANY, *December 31st, 1861.* }

To the Honorable the Legislature of the State of New York :

Pursuant to the provisions contained in the Revised Statutes, the Canal Commissioners submit their

✓ ANNUAL REPORT FOR THE YEAR 1861.

The term of office of John M. Jaycox expired December 31st, 1860, and Samuel H. Barnes who was elected Canal Commissioner at the preceding election, having died before January 1st, 1861, the Canal Commissioners remaining in office at that time were Hiram Gardner, whose term of office expires this day, and William I. Skinner, whose term of office expires December 31st, 1862.

On the 16th day of January, 1861, Benjamin F. Bruce was appointed by your honorable body, Canal Commissioner, to fill vacancy caused by the death of Samuel H. Barnes. The term of office of Mr. Bruce also expires this day.

The Board of Canal Commissioners was organized at their office in the city of Albany, on the 16th day of January, 1861, by the election of Hiram Gardner as President, and of William I. Skinner as Secretary.

To William I. Skinner was assigned, in special charge, the eastern division of the canals, and is made up as follows:

	Miles.
Erie canal, from Albany to the east bank of the Oneida Lake canal	136
Champlain canal	66
Glens Falls feeder	12
Pond above Troy dam	3
Black River canal, and Black River improvement	98
	<hr/>
	315
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To Benjamin F. Bruce was assigned, in special charge, the middle division of the canals, which embraces the following:

	Miles.
Erie canal, from the east bank of the Oneida Lake canal to the county line between Seneca and Wayne counties, including the several feeders and reservoirs,	76
Chenango canal, feeders and reservoirs	97
Oswego canal	38
Oneida Lake canal	7
Oneida River improvement	20
Seneca River towing-path	5 $\frac{3}{4}$
Cayuga and Seneca canal	23
Cayuga inlet	2
Crooked Lake canal	8
Chemung canal	23
Chemung canal feeder	16
Seneca River improvement	12 $\frac{1}{2}$
	<hr/>
	329
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To Hiram Gardner was assigned, in special charge, the western division of the canals, which embraces the following:

	Miles.
Erie canal, from the county line between Seneca and Wayne counties, to Buffalo, including the Main and Hamburg street canal, slips, and basins at the latter place	155
Genesee Valley canal	118
Extension of Genesee Valley canal	7
	<hr/>
	280
	<hr/>
Total authorized canals,	924
	<hr/>

EASTERN DIVISION.

CANAL REPAIRS.

ERIE CANAL.

The eastern division of the Erie canal, commencing with the south end of the Albany basin, extending to the east bank of the Oneida lake canal at Higginsville, including that part of the Champlain canal beginning at its junction with the Erie canal at the foot of the guard lock at Mohawk river, also including all feeders, dams, side-cuts and structures connected therewith, is divided into five superintendent or repair sections: The first three of which, eighty-four miles in length, have, since 26th February, 1861, been under and in charge of Robert C. Dorn, superintendent; and the remaining two, fifty-eight miles in length, in charge of John Beardslee, superintendent. Prior to February 26, the whole eastern division of the Erie canal, one hundred and forty-two miles in length, was in charge of Mr. Dorn as superintendent.

SECTION NO. 1—*Robert C. Dorn, Superintendent.*

This section extends from the south end of the Albany basin, to the west end of the lower Mohawk aqueduct, and includes the Port Schuyler and West Troy side-cuts, the Champlain canal from the junction to the Mohawk river, the Troy dam, sloop lock, and the pond above, making nineteen miles in length.

The structures upon the section are as follows, viz :

- 46 locks, including two weigh locks,
- 20 culverts,
- 17 road bridges,
- 182 lock gates,
- 1 aqueduct, (1,300 feet,)
- 6 waste weirs,
- 13 farm bridges.

The contract for the repairs of this section was let, March 1,

1860, to Charles T. Baldwin, at the sum of \$28,440 per annum, for the term of three years.

New structures.—A new bridge at Lansing's farm crossing, one mile above Cohoes, was built at a cost of \$528.83; a new watch house at the combined locks, costing \$44.69; and new lock gates, \$164.78,

Repairs to old structures.—Ferry street bridge, in Albany, was repaired at a cost to the State, of \$73.95. The weigh lock house and collector's office at West Troy, were repainted and repaired at an expense of \$412.92. The weigh house and collector's office at Albany has been repaired and painted, and cost \$354.50.

A ditch has been dug in the village of Cohoes, along the bottom of the slope near locks 8 and 9 and the Catholic burial ground, draining the adjoining land from the leakage of the canal, which was doing much damage. The ditch cost \$191.25.

Structures requiring repairs.—New bridges will be required at Fonda's and Harmony mills crossings. The old structures have been condemned, and are not in use. The locks on the section will need only general repairs.

About four miles of the canal between Albany and Troy were bottomed out, by the contractor for repairs, before the opening of navigation.

The basin at Albany has been dredged during the past season, to the uniform depth of seven feet.

Breaches.—There has been but one breach on this section this entire year. The towing path near Alexander's bridge, on the Champlain canal, about one mile above Troy, gave way, November 25, 1860, detaining navigation about thirty-six hours. The repairs cost \$453.51.

The expenditures upon this section for the past year are as follows:

Amount expended by sup't R. C. Dorn.....	\$7,188 92
do paid repair contractor	34,608 64
Total for the year	<u>\$41,797 56</u>

SECTION No. 2.—Robert C. Dorn, Superintendent.

This section extends from the west end of the lower Mohawk aqueduct to the head of lock No. 27, and is thirty-two miles in length.

The structures on this section are :

- 18 locks—1 guard lock,
- 1 dam,
- 19 culverts,
- 23 road bridges,
- 3 aqueducts,
- 2 waste weirs,
- 16 farm bridges,
- 1 towing-path bridge.

The contract for the repairs of this section was let, March 4th, 1860, to William McClary, for the sum of \$9,700 per annum, for the term of three years.

New structures.—Two new bridges have been built in the city of Schenectady; one on State street, a double-track wrought-iron bridge, with side walk on each side, built on Heath's new plan. The expenditures of the superintendent upon the bridge and its approaches, were \$1,173.23. The other was at Frog alley crossing, a single roadway wooden bridge, cost \$601.98. A single roadway farm bridge was built at John McDermot's, near lock 19, and cost \$561.22.

Under a resolution of the Canal Board, passed April 26, 1861, a culvert at John Myers' road crossing, in the city of Schenectady, was built for the discharge of water from the waste weir, at a cost of \$335.32.

Repairs to old structures.—The road bridge in the village of Crescent was thoroughly repaired for \$221.30; many other bridges receiving slight, but all necessary repairs.

During the spring, the Mohawk river rose to such an unusual height as to overflow the banks of the canal near Philips' locks, filling the level, and, subsiding, carried many of the boats which had lain there during the winter, on to and over the towing path and across the canal. Those which would have offered obstructions to navigation, were removed before the opening of the canal, by the superintendent, at a cost of \$359.96.

The docking in San Sai Kill creek having become undermined, and in very bad condition, was replaced by new docking, from the aqueduct to the road crossing. Three hundred lineal feet of docking, and one hundred and twenty-five feet of wall were built at a cost of \$3,358.78.

Structures requiring repairs.—On the three, and three and one-half mile levels, there are about four miles of canal which should

be bottomed out before spring, and the towing path needs raising at the same point. The bridges at Philips' lock and at Vedder's (three miles below Schenectady) are unsafe, and should be rebuilt, and those at John and Joseph Kline's need repairs.

The dam at the upper aqueduct is every spring considerably damaged by the ice passing over it, and receives general repairs. It will require more than usual repairs the ensuing spring.

The expenditures upon this section the past year are as follows

Amount expended by superintendent.....	\$10,790 74
do paid repair contractor	9,470 78
Total for the year	<u>\$20,261 52</u>

SECTION No. 3—*Robert C. Dorn, Superintendent.*

This section extends from the head of lock No. 27 to head of lock No. 33, Montgomery county, and is thirty-three miles in length. The structures embraced on this section are :

- 14 lift locks,
- 2 guard locks,
- 10 aqueducts,
- 5 waste weirs,
- 37 farm bridges,
- 18 road bridges (wood,)
- 2 road bridges (iron,)
- 1 wire suspension foot bridge at Fort Plain,
- 1 dam, (500 feet in length,)
- 3 workshops, and 3 lock houses.

The repairs on this section were, on 23d day of April, 1859, let to John McDonald, for \$7,440 per annum, for a term of three years from the 1st day of May, 1859.

New structures.—None.

Repairs to old structures.—The structures upon this section have been kept in good order, and have needed only slight repairs, with the exception of Schoharie creek dam, which has needed large repairs to keep the water to the required height. There has been expended upon it \$2,062.92. The dam has for a long time been in bad condition; it is partially built of brush, and stone, and every freshet washes it out. A new stone dam is now in process of construction, to be completed before low water next season.

The bottom of the canal at Big and Little Nose, on the fourteen mile level, was concreted, and the slope wall repaired in April, before the opening of navigation, and cost \$596.77. The bottom of the canal at these points is of rock, and has been leaking badly through the seams and crevices of the rocks, since the first construction of the canal. The channel of the creek at Fultonville has been cleaned out, and the gravel washed in, removed.

Structures requiring repairs.—The locks on this section will need some repairs before the opening of navigation, and the aqueducts at Fort Plain, Spraker's, Canajoharie, Lasher's, Yatesville and Printup's will require pretty thorough repair. Navigation has been uninterrupted the past season.

The expenditures upon this section during the past year are as follows:

Amount expended by superintendent.....	\$7,180 23
do paid repair contractor.....	7,418 00
Total for the year.....	<u>\$14,598 23</u>

SECTION No. 4—*John Beardslee, Superintendent.*

This section extends from the head of lock No. 33 to the head of lock No. 45, and is twenty-four miles in length. The following are the structures upon this section:

- 24 locks—1 guard lock,
- 192 lock gates,
- 4 aqueducts,
- 7 waste weirs,
- 10 culverts,
- 26 farm bridges, (wood,)
- 13 road bridges, (wood,)
- 2 road bridges, (iron,)
- 1 tow-path bridge, (wood,)
- 1 draw bridge, (wood,)
- 2 dams,
- 3 feeders with guard locks,
- 8 lock houses,
- 2 work shops,
- 12 watch houses.

The repairs upon this section were, on the 1st day of May, 1859, let to John F. Hosch, for the term of three years from that date, for the sum of \$8,849 per annum.

New structures.—Four new lock gates have been built so as to be in readiness for use when needed. They cost \$825.27.

Snubbing posts have been set at short distances from each other, near the locks, upon the whole length of the section, and cost in the aggregate \$338.62.

The towing path bank, near Schuyler's, is quite narrow, and has for some years past been gradually sliding into the river. It was a bad place, and there was danger of the whole bank going out. Piles have been driven in the river at the foot of the slope, for its protection, and the bank has been laden down with loose stone. It cost \$536.52, and is now secure.

The increased depth of water in the canal caused leakages in some places in German Flats, upon the land below, and rendered ditching necessary for drainage. Some hundred yards of ditch were dug, and cost \$445.55.

Old structures repaired.—The locks upon the section were variously repaired, and cost for repairs, \$304.35. Some few repairs were made to the aqueduct at Little Falls; they cost \$152.01. Repairs of bridges cost \$80.02. State scow and repairs, \$162.11. Dams, \$9.28. Slope wall, \$10. Berm bank, \$52.50.

Structures requiring repairs.—The towing path at the head of lock 34 should be altered and docked anew; and the towing path between locks 40 and 41 should be raised and graded nearly the whole distance. The banks of the Rocky rift feeder, near Smith's, require raising; they are so low that the ice from the river, at high water, runs into and fills the feeder, obstructing the free passage of water. The bottom of the canal, between lock 44 and McGown's road bridge, should be excavated; and the benches in the canal on sections between locks 40, 41, 44 and 45, removed.

New structures required.—A waste weir and spill way will be necessary on feeder level, near Mindenville. The waste weir above lock 40 should be rebuilt, and Palmer's farm bridge, which was carried away by a passing boat, must be replaced.

Breaches.—Two breaches have occurred on this section the past year. The first, May 10, at the waste weir on Rocky rift feeder, was repaired at a cost of \$752.49. The second, June 29, was a breach in the bottom of the canal, through an old and hidden culvert, on the level below lock 35. The repairs were made by the contractor. These two breaches caused the only

EASTERN DIVISION.

CANAL REPAIRS.

ERIE CANAL.

The eastern division of the Erie canal, commencing with the south end of the Albany basin, extending to the east bank of the Oneida lake canal at Higginsville, including that part of the Champlain canal beginning at its junction with the Erie canal at the foot of the guard lock at Mohawk river, also including all feeders, dams, side-cuts and structures connected therewith, is divided into five superintendent or repair sections: The first three of which, eighty-four miles in length, have, since 26th February, 1861, been under and in charge of Robert C. Dorn, superintendent; and the remaining two, fifty-eight miles in length, in charge of John Beardslee, superintendent. Prior to February 26, the whole eastern division of the Erie canal, one hundred and forty-two miles in length, was in charge of Mr. Dorn as superintendent.

SECTION No. 1—*Robert C. Dorn, Superintendent.*

This section extends from the south end of the Albany basin, to the west end of the lower Mohawk aqueduct, and includes the Port Schuyler and West Troy side-cuts, the Champlain canal from the junction to the Mohawk river, the Troy dam, sloop lock, and the pond above, making nineteen miles in length.

The structures upon the section are as follows, viz :

- 46 locks, including two weigh locks,
- 20 culverts,
- 17 road bridges,
- 182 lock gates,
- 1 aqueduct, (1,300 feet,)
- 6 waste weirs,
- 13 farm bridges.

The contract for the repairs of this section was let, March 1,

New structures.—Whittle's iron road bridge knocked down by a passing steam tug has been rebuilt and cost \$815.86.

Old structures repaired.—The weigh lock at Utica was altered and the cradle enlarged, increasing the capacity of the lock at a cost of \$482.79. Other repairs, made by the superintendent, are slight, and cost, including tools purchased in 1860, \$424.09.

Structures requiring repairs.—The bridge at Ferguson's is old and unsafe, and will have to be rebuilt. The culvert in lock 46 is too small to pass the necessary amount of water and must be enlarged. The towing-path one mile east of Oriskany should be supported by piles and timbers for nearly one half mile, the bank is insecure. The towing-path from lock 46 at Utica, to Yorkville, should be graveled and graded. The bench in the canal above lock 45, to the toll-gate, ought to be removed, and the canal bottom from Utica to the bridge below should be excavated and the slope wall repaired.

The expenditures upon this section, for the year past, are as follows :

Amount expended by Superintendent Dorn, (1860) ..	\$984 16
Amount expended by Superintendent Beardslee, (1861)	1,630 01
Amount paid contractor for repairs,	7,563 63
Total for the year,	<u>\$10,177 80</u>

A large amount of the expenditures charged to the Erie canal as repairs, were occasioned by the assistance rendered boats locked in the ice near the close of navigation last fall. Some nine hundred boats were frozen in on the eastern division of the Erie canal, and were, with the exception of one hundred and ninety-three brought through to tide water. This expenditure amounted to nearly nine thousand dollars.

The following are the amounts expended on the eastern division of the Erie canal, for repairs, for ten years last past :

YEAR.	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.	Sec. 6.	Total.
1852	\$136,016 49	\$47,858 59	\$51,651 16	\$35,904 45	\$33,288 04	\$24,171 07	\$328,889 80
1853	101,124 60	32,101 88	44,403 64	33,128 69	29,602 41	35,803 29	276,164 51
1854	75,298 10	42,256 86	61,674 97	46,187 95	29,099 71	44,120 44	282,642 82
1855	57,875 36	63,016 64	76,597 47	42,361 22	32,354 39	28,125 13	300,330 21
1856	42,954 22	27,181 56	49,282 00	44,436 55	40,147 81	24,489 52	228,441 66
1857	46,113 36	17,953 21	21,990 18	35,598 80	29,922 29	14,291 32	165,869 16
1858	46,680 34	28,398 85	25,876 28	35,831 81	27,260 04	.....	163,997 32
1859	102,000 64	26,166 15	37,766 71	26,969 66	22,842 36	.....	215,745 52
1860	41,054 96	25,551 84	13,611 45	10,670 26	19,417 25	.....	110,814 76
1861	41,797 56	20,261 52	14,598 23	13,444 52	10,177 80	.....	100,279 63

CHAMPLAIN CANAL.

This canal commencing with the foot of the guard lock on the Mohawk river and extending to Whitehall, including the Glens Falls feeder, is divided into three superintendent's or repair sections. The whole length of the canal is about seventy-six miles. Alonson Welch had the entire superintendence of the canal until February 6, 1861, when Lyman Holbrook was, by resolution of the Canal Board, appointed superintendent over the three sections. On April 5, 1861, Alexander Barckley, by resolution of that day, was appointed to the superintendence of sections Nos. 1 and 2: Mr. Holbrook continuing in the superintendence of section No. 3.

SECTION No. 1.—*Alexander Barckley, Superintendent.*

This section extends from the south end of the guard lock at Cohoes, to the south end of the first lock north of Fort Miller bridge, and is twenty-eight miles in length.

The contract for the repairs of this section was let to Charles J. De Graw, for the term of five years, commencing August 1st, 1860, at the sum of \$8,659 per annum.

The structures upon the section are :

- 12 locks,
- 1 aqueduct,
- 11 waste-weirs,
- 8 culverts,
- 2 work shops,
- 1 store house,
- 36 farm bridges,
- 28 road bridges,
- 7 towing-path bridges,
- 7 lock houses,
- 1 watch house,
- 1 timber shed,
- 2 dams, (one across Hudson, and one across Mohawk river,)
- 1 watch house and collector's office,
- 5 foot bridges.

New structures.—Three new farm bridges have been built during the past season, at Waterford, Bemis Heights and Coville. They were built on a new plan of structure and cost \$424.02. A new foot bridge at guard lock No. 2, on the Mohawk river, was built and cost \$105.09. The canal has been redocked near Three

Locks on the three and three-quarter mile level, at Ensign's Landing, Chase's bridge and Whoten's gravel bed on the sixteen mile level, at an outlay of \$657.23. Four lock gates have been built and ironed, ready to be used in case of the giving out of any of the gates at the Three Locks, they cost \$494.66.

Old structures repaired.—Deming's new culvert at Stillwater, upon examination by the division engineer, was found to be insecure, and was, under his direction, concreted, graveled and puddled its entire length, before the opening of navigation, at a cost of \$277.63.

In May last, soon after the opening of navigation, the channel across the Mohawk river, was dredged out and cost \$500. The channel had, during the fall and winter, washed so full of sand as to seriously obstruct navigation. The prism of the canal at Levensee's and Cold Spring was also dredged at an expense of \$200. Several gravel beds on the sixteen mile level have been opened and made convenient of access. Slight repairs have been made to Schuylerville aqueduct, the waste-weirs, locks and bridges which, together with other miscellaneous expenses, amount to \$405.67.

Structures requiring repairs.—The following named structures will need rebuilding or thorough repair the coming spring: Coville and Hudson river waste-weirs; the Schuylerville aqueduct; Smith's, Chase's, Hill's, Fisher's, and Salisbury's farm bridges; Powel's, Baldwin's, Hanny's, and Waterford side-cut bridge abutments. The towing-path on the sixteen, four, one, and three and three-quarter mile levels should be raised and graded.

Sunken boats.—There have been but two boats sunken upon the section; they were both old and heavily laden. There was no delay in navigation consequent upon the sinking of either.

The expenditures upon this section for the past year are as follows:

Amount expended by Superintendent Welch, (1860) ..	\$800 66
Amount expended by Superintendent Barckley, (1861)	6,425 09
Amount paid contractor for repairs	5,080 09
Total for year	<u>\$12,305 84</u>

SECTION No. 2.—*Alexander Barckley, Superintendent.*

This section extends from the south end of the first lock north of Fort Miller bridge to Dunham's basin, and includes the Glens

Falls feeder and pond above, making in all twenty-four miles in length.

The repairs of this section were let to Anson Bangs for the term of five years, commencing August 1st, 1860, for the sum of \$9,300 per annum.

Upon this section the structures are as follows :

- 19 locks,
- 7 waste-weirs,
- 19 farm bridges,
- 3 towing-path bridges,
- 1 work shop,
- 1 dam across the Hudson river, 900 feet long,
- 1 aqueduct,
- 9 culverts,
- 17 road bridges,
- 10 lock houses,
- 1 store house.

New structures.—A double track road bridge was built in the village of Fort Edward, the past summer, and cost \$565.37.

Old structures repaired.—New docking has been put in at the head of Bassett lock. The old lock house was removed to a more convenient situation and repaired, and the banks on either side of the lock were raised and graded. These, together with some miscellaneous expenditures, amount to \$346.82.

An inspector, to measure draft of boats at Fort Edward, was appointed by the Commissioner, and paid by the superintendent of repairs, in total \$264.

Structures requiring repairs.—The following named structures will have to be rebuilt or be thoroughly repaired the coming year : The locks at Fort Miller, Moseskill and Fort Edward, the two mile level waste-weir, Lincoln's farm bridge, Wood-lock road bridge, Glens Falls feeder, and Gallucia's bridge abutments. The towing-path on the five mile level is, in many places, too low and should be raised and graded.

Sunken boats.—There has been but one sunken boat upon the section ; it caused some slight detention to navigation.

The expenditures upon this section for the year past, have been as follows :

Expenditures by superintendent Welch, (1860)	\$1,005 45
do do Barckley, (1861) ..	1,365 07
Amount paid repair contractor	9,118 47
Total for the year	<u>\$11,488 99</u>

GLENS FALLS FEEDER.

The Glens Falls feeder is one of the most important parts of the Champlain canal. It is used both as a feeder and as a canal for navigation, and is about ten miles in length. It commences at and takes its water from the dam in the Hudson river about three miles above Glens Falls and is brought into the canal near Sandy Hill and supplies the canal southward as far as Fort Miller bridge two miles above Schuylerville, about eleven miles, and northward as far as Wood creek, about twelve miles.

This feeder has for a long time been the subject of complaint from those navigating it and from those having charge of it. It passes over in its course to the canal, several broken lime stone ledges, and loses in its passage through these rock cuts so much of its water through the seams and crevices that at the lower end, there is, except at unusually high water, insufficient for the purposes of navigation.

A law was passed by the Legislature of 1860, authorizing the stoppage of these leaks, and appropriating the funds therefor. The work will necessarily have to be done in the winter season, and preparations are now being made to perform it before the opening of navigation in the spring of 1862.

SECTION No. 3—*Lyman Holbrook, Superintendent.*

This section extends from Dunham's basin to Whitehall, a distance of twenty-two miles. The repairs of this section were, July 17, 1860, let by contract to Solon Vandenburg for the term of five years commencing August 1, 1860, for \$4,300 per annum.

The following are the structures upon it:

8 locks,	20 farm bridges,
3 culverts,	4 towing-path bridges,
5 waste-weirs,	5 small dams on Wood creek,
7 road bridges,	4 lock houses.

There has been no new structure upon this section during the past year.

Old structures repaired.—One abutment of Company's bridge has been rebuilt, and the abutments of the bridge at Fort Ann been repaired. The towing-path upon Wood creek and upon Summit level has, in places, been raised, and graded, and the docking on Summit level, has been repaired, and the canal been bottomed out.

Structures requiring repair.—Moore's farm bridge, the bridge at Smith's basin, and the abutments on the berm side, bridges number nine, and ten, on the five-mile level, and the waste-wier at Smith's basin should be rebuilt. The towing-path on Summit level, between Smith's and Dunham's basins should be raised.

Breaches.—In May last a small breach occurred in Emphy's waste-wier. Navigation was suspended, in consequence, about six hours.

Sunken boats.—A boat sank in October, 1860, in the narrows of Wood creek, detaining navigation about eight hours.

The expenditures upon this section for the year, are as follows:

Expended by Superintendent Welch, (1860,).....	\$365 72
do do Holbrook, (1861,).....	1,420 96
Amount paid repair contractor.....	3,166 29
Total for the year.....	<u>\$4,952 97</u>

The following are the amounts expended on the Champlain canal for repairs during the last ten years:

Years.	Section 1.	Section 2.	Section 3.	Total.
1852,	\$37,611 43	\$19,246 62	\$18,660 96	\$75,519 01
1853,	38,225 47	18,791 71	21,946 18	78,963 36
1854,	31,025 06	24,894 34	16,663 01	73,463 48
1855,	48,756 85	24,083 28	17,543 08	90,383 21
1856,	21,191 60	11,647 30	12,535 30	45,374 20
1857,	54,357 76	9,574 78	8,707 77	72,640 31
1858,	42,386 75	24,561 20	14,111 21	81,059 16
1859,	37,306 00	15,726 39	11,843 37	64,875 76
1860,	26,997 46	16,621 80	12,401 70	56,020 96
1861,	12,305 84	11,488 99	4,952 97	28,747 80

BLACK RIVER CANAL.

This canal is divided into two superintendent sections; a third section is formed by the Black river improvement. The whole canal, river improvement, feeders and reservoirs were, until February 26, 1861, superintended by Woodman Kimball, when Lemuel W. Bowdish was appointed.

The dividing line between sections numbers one and two was changed at the time of letting the contracts for repairs, in April last, and about fourteen miles, from the southerly end of section two, was added to section number one.

SECTION No. 1.

This section extends from the junction of the Black River canal with the Erie canal, at Rome, to a point one thousand feet north of lock No. 70, and is about twenty-four miles in length.

The following are the structures upon this section:

- 70 lift locks,
- 1 guard-lock,
- 5 waste-weirs,
- 10 culverts,
- 15 road bridges,
- 2 road and change bridges,
- 2 draw bridges across Delta feeder,
- 19 lock houses,
- 3 aqueducts,
- 1 aqueduct over Rome and Ogdensburgh railroad,
- 18 farm bridges,
- 2 farm bridges, owned and supported by individuals.

The contract for the repairs of this section was let to Edward H. Edwards, for the term of four years and eight months, commencing May 1, 1861, at \$8,700 per annum.

The Delta feeder has been completed and brought into use the past season.

Old structures repaired.—Two gates at lock No. 9, one at locks Nos. 22 and 65, have been put in; various other little repairs have been made to these and other locks. Wilcox's farm bridge has been almost wholly rebuilt; both abutments of Wadsworth's change bridge, Wager's, Braton's and Bushkirk's farm bridges have been rebuilt, and some others have been repaired. Stringer kill and upper Mohawk aqueducts, and the waste weirs at Wil-

cox's bridge, Westernville, and lock No. 70, have been put in order.

The whole section was thoroughly bottomed out before the contractor took possession of the section, in May last, and cost \$2,520.34.

Structures requiring repairs.—Almost every lock upon this section will require considerable repairs. They are in bad order, and many of the gates have to be moved by windlasses. A new bridge is necessary at North Western.

Sunken boats.—Two boats have been sunk on the section; the first one making a delay of six, and the second of twelve hours in navigation. These detentions, together with the one of thirty-six hours occasioned by putting new gates in lock No. 58, are the only delays of the year.

The expenditures upon this section for the past year are as follows :

Expenditures by Superintendent Kimball, (1860,)...	\$341 20
do do Bowdish, (1861,)...	5,119 85
Amount paid repair contractor.....	4,501 32
Total for the year.....	<u><u>\$9,962 37</u></u>

SECTION No. 2.

This section commences at a point one thousand feet north of lock No. 70, and extends to the junction with the Black river at Lyons' Falls, a distance of twelve miles. It includes the Boonville feeder to Forestpost, a distance of ten and a half miles; also the land above the dam at Forestpost, some two miles in length, and the Moose River improvement above the dam at Lyons' falls, one and one-half miles long.

The contract for the repairs of this section was let to Benjamin F. Maxson, for the term of five years, commencing March 1, 1861, at \$4,178 per annum.

The following are the structures upon this section :

- 39 lift locks,
- 1 guard-lock,
- 13 lock houses,
- 1 aqueduct,
- 6 waste weirs,
- 10 culverts,
- 2 dams,
- 16 road bridges,

- 22 farm bridges,
- 1 farm and change bridge,
- 1 road and change bridge,
- 1 towing-path bridge,

New structures.—New bridges have been built at Douglas', (near Port Leyden,) widow Roberts' and John Owens'. They cost, in the aggregate, \$1,029.60.

Old structures repaired.—The Main-street bridge at Boonville has been replanked, and Forestpost bridge abutments have been rebuilt.

Structures requiring repairs.—James Ward's and William Jackson's bridges must be re-built. The superstructure and abutments to Lobdel's bridge on the feeder should be built anew. Two lock gates are needed at the guard-lock, and other locks need repairs.

Breaches.—There have been two breaches on this section, the first in May last, in lock No. 76. The soil was washed from under the lock walls leaving them in a dangerous and precarious situation. It was repaired in three days. The second breach occurred July 2, and was of quite a serious character. It was occasioned by heavy rains, which filled the canal to an unusual height, and the unusual weight of water broke away the bank where it was narrow, on the side hill, for quite a distance, and in some places swept out the earth nearly fifty feet below the bottom of the canal. It was thought that the construction of a new channel would be the quickest, most economical and safest way of repairing the break. A new channel of about three hundred feet in length was dug, the break repaired and navigation resumed on the 27th of the same month. It cost about \$2,000.

The expenditures on the section for the year are as follows:

Expenditures by Superintendent Kimball, (1860,)...	\$580 20
“ “ Bowdish, (1861,) ..	291 66
Amount paid repair contractor	8,767 73
Total for the year	<u>\$9,639 59</u>

SECTION No. 3,

Includes the Black River improvement from Lyons' Falls to Carthage, a distance of $42\frac{1}{2}$ miles, and the repairs are contracted for by Ward & McVickar, for \$3,800 per annum; their contract expires November 1, 1864.

The following are the structures upon this section :

- 1 road bridge at Carthage,
- 1 draw to Beach's bridge,
- 1 draw to Illingsworth's bridge,
- Dam at Carthage.

No new structures have been erected the past year though there are several in progress of construction and nearly complete.

There have been no breaks on this section nor delays of importance except that there was some hindrance to passing boats in the month of September, during the construction of the dam at Otter creek.

There has been no expenditures upon this section, by the superintendent, whatever.

The total amount expended is the amount paid the contractor for repairs—\$3,799.92.

RESERVOIRS.

The reservoirs on the head waters of the Black river are in fine condition, and have furnished a bountiful supply of water to the Black river and Erie canals, the whole season, except during the time required to repair the break on section No. 2 of the Black River canal.

Woodhull Lake reservoir has seventeen feet of water and will not be drawn down this year. South Branch reservoir is full and will not be drawn down to any extent. North Branch reservoir has supplied most of the water required during the season, and will be filled again at the opening of navigation in the spring.

The following are the amounts expended on the Black River canal, and Black River improvement, for repairs for ten years last past :

Years.	Sec. 1.	Sec. 2.	River Imp.	Total.
1852	\$8,370 56	\$22,240 37	-----	\$30,610 93
1853	6,895 85	19,324 03	-----	26,219 88
1854	12,321 43	16,256 82	-----	28,578 25
1855	9,347 28	24,514 40	-----	33,861 68
1856	4,826 55	12,377 18	-----	17,203 73
1857	3,935 68	9,860 97	-----	13,796 65
1858	3,999 00	14,622 75	-----	18,621 75
1859	8,107 70	16,818 03	-----	24,925 73
1860	4,821 54	14,724 85	\$2,741 55	22,287 94
1861	9,962 37	9,639 59	3,799 92	23,401 88

OLD ACCOUNTS.

In the report of the Canal Commissioners of last year mention was made of the great number of old and unpaid accounts against the State for the canals. Quite a large number were paid last year and many of them were then, as those paid of the present year are now, charged to the repairs for the year, although they are properly chargeable to the repairs of the year when the account accrued. No accounts have been allowed or paid which have not been carefully scrutinized and the justice of the claim clearly proven.

The following schedules will show the amounts paid during the past year and charged to the repairs of the year.

OLD ACCOUNTS PAID BY CANAL COMMISSIONER AND CHARGED TO
REPAIR ACCOUNT OF THE CANALS.

To whom paid.	Amount.	Date of account.
R. H. Bangs	\$80 00	----
L. Barrett	20 00	1852
P. H. Bender	18 40	1858
P. H. Bender	27 30	1858
D. Barrett	100 98	1853-4
J. Carrington	55 00	1852
L. Capron	22 00	1853
F. Gates	24 19	1853
T. Gates	5 00	1853
T. & F. Kearney	27 40	----
S. B. Lansing	250 00	----
C. Moore	21 88	1853
L. Pardo	80 00	1859
L. C. Rodgers	11 50	----
A. A. Snyder	550 00	----
J. Schaughany	3 00	----
J. M. Smith	85 50	----
J. Souzee	25 00	1853
G. Tucker	34 50	1852
D. Wetzell	50 00	1856

OLD CLAIMS PAID BY SUPERINTENDENTS OF REPAIRS AND CHARGED
TO THE REPAIRS OF THE YEAR 1860, 1861.

Erie Canal.—Section No 2.

Name.	Amount.	Date of account.
J. Clute	\$13 00	1858

Section No. 3.

Argusinger & Wemple	56 50	1858
A. Crawford	13 60	1858
B. Clute	10 75	1858
J. F. Clute	7 31	1857
Donaldson & Co	968 93	1858
N. Dauchy 2d	93 62	1859
G. G. Fitch	24 21	1856
J. H. Moyer	36 49	1858
A. G. Newkirk	90 00	1857
J. Pruyn	208 00	1858
E. G. Putnam	39 37	1857
E. Shumaker	44 47	1857
J. Vanderhyden	1 50	1858
H. Woodbeck	13 50	1858
Yates & Ecker	32 41	1857

Section No. 4.

C. Budlong	6 00	1858
Crosby & Sons	10 50	1858
P. & E. Reed	4 00	1858
W. R. Stevens	1 56	1858
W. R. Steel	108 00	1858
H. Whitman	5 63	1858

Section No. 5.

M. Barney	4 00	1859
B. C. Bateman	9 00	1859
W. S. Brainard	8 00	1859
Z. S. Burdick	3 75	1859
G. Cone	27 50	1859
Collins & Tobin	27 00	1859
J. Elwell	45 32	1859
P. Echart	1 12	1859
D. H. Healt	7 00	1859
G. Harris	7 50	1859

Name.	Amount.	Date of account.
S. B. Johnson.....	\$34 00	1859
G. Kelly.....	3 00	1859
T. Kelly.....	13 50	1859
A. Luker.....	10 00	1859
M. Miller.....	1 12	1859
M. Monell.....	3 00	1859
A. Newland.....	2 25	1859
J. Rodgers.....	12 75	1859
W. H. Rose.....	31 57	1859
J. Sayre & Son.....	17 08	1859
R. Slater.....	5 50	1859
Telegraph company, Rome.....	24 26	1859
W. & J. Thomas.....	25 75	1859
W. & J. Thomas.....	11 75	1859
A. Van Patten.....	114 92	1857-9
E. Van Schouch.....	5 25	1859
J. Wright.....	3 00	1859
J. Winkler.....	1 12	1859
J. White, jr.....	92 25	1859
S. Wheeler.....	3 00	1859
H. Whitman.....	6 90	1859

Champlain Canal.—Section No. 1.

A. G. Hall.....	\$14 00	1854
J. C. Park.....	18 00	1852-3

The following Table shows the Amounts expended for Repairs of the entire Eastern Division, and upon the various Sections of which it is composed, for ten years past, beginning with 1852, and terminating with the past year.

YEARS.	EASTERN DIVISION, ERIE CANAL.					
	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.	Sec. 6.
1852	\$136,106 49	\$47,858 59	\$51,651 16	\$35,904 45	\$33,288 04	\$24,171 07
1853	101,124 60	32,101 88	44,403 64	33,128 69	29,602 41	35,803 29
1854	75,298 10	42,256 86	61,674 97	46,187 95	29,099 71	44,120 44
1855	57,875 36	63,016 64	76,597 47	42,361 22	32,354 39	28,125 13
1856	42,954 22	27,181 56	49,232 00	44,436 55	40,147 81	24,489 52
1857	46,113 36	17,953 21	21,990 18	35,598 80	29,598 80	14,291 32
1858	46,630 34	28,398 85	25,876 28	35,831 81	27,260 04	-----
1859	102,000 64	26,166 15	37,766 71	26,969 66	22,842 36	-----
1860	41,054 96	25,551 84	13,611 45	10,679 26	19,417 25	-----
1861	41,797 56	20,261 52	14,598 23	13,444 52	10,177 80	-----

NOTE.—In 1858, the Eastern Division of the Erie canal, then containing six sections, was re-divided into five sections covering the same length of canal.

Table of Amounts for Repairs of Eastern Division—Continued.

YEARS.	CHAMPLAIN CANAL.			BLACK RIVER CANAL.			Total.
	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 1.	Sec. 2.	Improvement.	
1852	\$37,611 43	\$19,246 62	\$18,660 96	\$8,370 56	\$22,240 37	-----	\$435,019 74
1853	38,225 47	18,791 71	21,946 18	6,895 85	19,324 03	-----	381,357 75
1854	31,025 06	24,894 34	16,663 01	12,321 43	16,256 82	-----	383,803 48
1855	48,756 85	24,083 28	17,543 08	9,347 28	24,514 40	-----	424,575 10
1856	21,191 60	11,647 30	12,535 30	4,826 55	12,377 18	-----	291,019 59
1857	54,357 76	9,574 78	8,707 77	3,935 68	9,860 97	-----	252,306 12
1858	42,386 75	24,561 20	14,111 21	3,999 00	14,622 75	-----	263,578 23
1859	37,306 00	15,726 39	11,843 37	8,107 70	16,818 03	-----	305,537 01
1860	26,997 46	16,621 80	12,401 70	4,821 54	14,724 85	\$2,741 85	188,623 66
1861	12,305 84	11,488 99	4,952 97	9,962 37	9,639 59	3,799 92	152,429 31

NOTE.—Sections Nos. 1 and 2 of the Black River canal were re-divided during the past year and fourteen miles from the southerly end of Section 2 added to Section 1.

DIVISION ENGINEER'S OFFICE,
ALBANY, October 1, 1861. }

HON. W. I. SKINNER, *Canal Commissioner*:

DEAR SIR—I herewith submit statements showing the condition and progress of work under contract on the Eastern division of the New York State canals, during the nine months ending September 30, 1861.

The tables annexed have reference to work under contract, both on enlargement and repairs, which has been under the direction and supervision of the engineers.

All of the contracts for the enlargement of the Erie canal on this division now existing are fulfilled, and final settlements will be rendered before the close of the year. The work remaining to be done, to fully complete the enlargement of the division, consists in raising banks and bottoming the canal at several points where, in the original construction of the canal, the work was left in an unfinished condition.

A large proportion of the enlargement on this division has been constructed with slope walls resting upon benches. This plan was adopted at the commencement of the enlargement, and work prosecuted under it until experience showed the necessity of running the slope walls to canal bottom.

The large increased business of the canals will soon demand the removal of these benches and the construction of the enlargement on the modern plan. At these points, where crowds of boats occur, and especially during the latter part of the season of navigation, when the ice is forming in the canal, it is often impossible to pass sufficient water to keep up the levels.

The contract for the construction of the Schoharie creek dam was awarded so late in the season that it was not practical to complete the work this year, as required by the terms of the contract. The dam can be completed and in use during the dry season in 1862.

The following contracts on the Champlain canal, under act chapter 213, Laws of 1860, have been completed:

Raising banks from Erie canal to lock No. 1; Bassett lock; rebuilding Wilbur's basin, and culvert at Stillwater. The driving of piles on the 16 and 5-mile levels, and culvert at weigh lock are nearly completed.

During the present season the following work has been placed under contract:

Weigh lock and scale at Waterford ; south guard-lock at Cohoes, and Parish lock (No. 17,) on Wood creek. These three contracts will be completed by the opening of navigation in 1862.

Your attention is particularly directed to the leaks in Glens Falls feeder, and to widening the channel of the canal at different points where the same is so narrow that two boats cannot pass.

The following contracts on the Black River canal have been completed during the present year :

Dam and lock at Otter creek ; South branch reservoir ; section work for Delta feeder, and bridges for Delta feeder.

Two bridges across the Black river, below Lyons' Falls, have been placed under contract this season, and will be completed during the summer of 1862. The bridges were authorized by act chap. 213, Laws of 1860, and were located as follows: one near Carter's and the other near Tiffany's landing.

The dam and lock at Otter creek having been completed, the improvement of Black river is as follows: $22\frac{1}{2}$ miles of slack water navigation between Carthage and Beach's bridge, caused by the dam at Carthage; 10 miles between Beach's bridge and the dam at Otter creek, maintained by dredging and keeping open channels, and 10 miles between Otter creek dam and Lyons' Falls, caused by said dam.

The three reservoirs, North Branch, Woodhull and South Branch are completed and in use. Originally it was contemplated to construct four reservoirs, and they were placed under contract ; in 1856, for want of funds, the work was suspended and subsequently the contracts for them were abandoned by the Canal Board.

Act chap. 326, Laws of 1859, directed the construction of so many of the four reservoirs formerly contemplated as would furnish 11,000 cubic feet of water per minute during the dry season. Under this act the three reservoirs mentioned have been completed ; they are capable of supplying 11,000 cubic feet of water per minute for 115 days consecutively.

TABLE No. 1.

STATEMENT showing the character of work, estimated cost at contract prices, amount of work done, during the nine months ending September 30, 1861, whole amount done, and amount remaining to be done under existing contracts on the Eastern division of the New York State canals.

CHARACTER OF WORK.	Estimated cost at contract prices.	Amount done from Jan. 1 to Sept. 30, 1861.	Whole amount done.	Amount remaining to be done.
<i>Enlargement of the Erie.</i>				
Sections Nos. 41, 42, 43 and 44	\$29,100 00	\$5,710 00	\$26,170 00	\$2,930 00
" 45, 46 and 47	34,550 00	5,330 00	33,330 00	1,220 00
" 58	11,459 95	1,639 95	11,459 95	settled.
" 60	38,000 00	-----	36,940 00	1,060 00
" 62	122,500 00	-----	122,500 00	-----
" 122	24,724 09	3,844 09	24,724 09	settled.
Bridge abutments on sections Nos. 33 and 35	6,270 00	5,710 00	5,710 00	560 00
Iron bridge superstructures at Port Jackson, Fultonville and foot of lock 30	6,773 92	3,203 92	6,773 92	settled.
Completion of enlargement from west end of section No. 47 to lock No. 29	9,297 00	7,120 00	7,880 00	1,417 00
Bottoming canal below and raising banks above lock No. 34, and raising banks between locks Nos. 39 and 40	19,640 00	18,740 00	18,740 00	900 00
Bottoming canal below lock No. 42, and raising banks on section No. 127	2,100 00	2,060 00	2,060 00	40 00
Raising banks between lock No. 18 and the lower Mohawk aqueduct	8,259 73	8,259 73	8,259 73	settled.

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Champlain.

Driving piles on the 16 and 5-mile levels	\$12,800 00	\$8,863 70	\$9,620 00	\$3,180 00
Re-building Bassett lock, (No. 10,) enlarged	14,823 36	14,660 00	14,660 00	163 36
Raising banks of Champlain canal, from Erie to lock No 1	4,381 70	4,381 70	4,381 70	settled.
Weigh lock and weigh master's office, at Waterford	14,144 00	3,040 00	3,040 00	11,104 00
Parish lock (No. 17,) on Wood creek	11,590 00	-----	-----	11,590 00
South guard lock at Cohoes	11,427 50	-----	-----	11,427 50
Scale for weigh lock	3,500 00	-----	-----	3,500 00
Culvert and coffer dam at Waterford	2,210 00	1,850 00	1,850 00	360 00
Box culvert in town of Stillwater	800 00	800 00	800 00	settled.
Re-building waste-weir at Wilbur's basin	5,822 24	3,972 24	5,822 24	settled.
	\$81,498 80	\$37,567 64	40,173 94	\$41,324 86

Black River.

Section work for Delta feeder	\$13,265 08	\$3,005 58	\$13,265 08	settled.
Bridges for Delta feeder	2,000 00	270 00	1,800 00	\$200 00
Dam and lock at Otter creek	38,800 00	10,870 00	36,890 00	1,910 00
South branch reservoir	11,196 27	-----	9,970 00	1,226 27
Bridge across Black river at Carter's landing	8,463 00	590 00	590 00	7,873 00
" " Tiffany's landing	7,869 00	2,890 00	2,890 00	4,979 00
	\$81,593 35	\$17,626 58	\$65,405 08	\$16,188 27

TABLE No. 2.

STATEMENT showing total amount done and amount paid on work not under contract, on the Eastern Division of the N. Y. State canals, from January 1st, to September 30, 1861, performed under the supervision of the Engineers.

Character of work.	Total amount done.	Amount paid.
<i>Erie Canal.</i>		
Raising abutments and approaches to Genesee and Schenectady str'ts bridges, West Troy	\$3,539 17	\$3,539 17
Repairs on locks and excavation in prism of canal on superintendent section No. 1	2,969 42	2,969 42
Repairs on locks and construction of lock bridges on superintendent section No. 2	625 31	625 31
Vertical wall below lock No. 45	1,243 49	949 19
Repairs on locks and excavation in prism on superintendent section No. 3	1,227 50	1,227 50
Raising berme bank and excavation of old benches on superintendent section No. 2	1,018 03	1,018 03
Altering gates in lock No. 45, constructing lock bridges, and repairs to lock No. 39, on superintendent section No. 4	806 96	806 96
Iron bridge superstructure in Washington street, Utica	2,026 30	1,494 81
	<u>\$13,456 18</u>	<u>\$12,630 39</u>
<i>Champlain Canal.</i>		
Repairs at Dunham's basin	<u>\$374 72</u>	<u>\$374 72</u>

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Character of work.	Total amount done.	Amount paid.
<i>Black River Canal.</i>		
Bridge and bents at Phelps, and sluice around lock No. 98	\$540 43	\$349 23
Repairs at lock 76, stop gate in Boon- ville feeder, and removal of big bevels in lock No. 98	948 99	948 99
	<u>\$1,489 42</u>	<u>\$1,298 22</u>

ABSTRACT OF FOREGOING TABLE.

	Estimated cost at contract prices.	Amount done from Jan. 1 to Sept. 30, 1861.	Whole amount done.	Amount remaining to be done.
Enlargement of the Erie canal -----	\$360,541 15	\$101,548 00	\$348,278 00	\$12,263 15
Repairs of the Erie canal -----	25,757 50	8,100 00	14,970 00	10,787 50
Miscellaneous -----	-----	13,456 18	-----	-----
Champlain canal -----	81,498 80	37,567 64	40,173 94	41,324 86
Miscellaneous -----	-----	374 72	-----	-----
Black River canal -----	81,593 35	17,625 58	65,405 08	16,188 27
Miscellaneous -----	-----	1,489 42	-----	-----
Total -----	\$549,390 80	\$180,161 54	\$468,827 02	\$80,563 78

Respectfully submitted.

W. B. TAYLOR,
Division Engineer.

By a regulation of the Canal Board, the superintendents of repairs are required to make frequent measurements of the depth of water on the mitre sill of each lock upon the canals under their charge, and to report the same monthly in detail.

The following table will show the depth of water, as measured and reported by the superintendents, at each lock upon the eastern division of the canals, for each month, commencing with the opening of navigation last spring to the date of this report.

Table showing the depth of water at each lock on the mitre sill for each month, as measured by the Superintendents of Repairs on the eastern division of the canals.

ERIE CANAL.

	April.	May.	June.	July.	August.	Sept.
	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
Mitre sill, lock 1.....	----	7 0	7 1	7 0	7 0	7 0
do 2.....	----	7 0	7 0	7 0	7 0	7 0
do 3.....	----	7 0	7 0	7 0	7 0	7 0
do 4.....	----	6 6	6 7	7 0	7 0	7 0
do 5.....	----	6 7	6 6	6 11	7 0	7 0
do 6.....	----	6 6	6 6	6 10	6 10	7 0
do 7.....	----	6 8	6 7	7 0	7 0	7 0
do 8.....	----	6 9	6 8	7 0	6 11	7 0
do 9.....	----	6 7	6 8	6 10	6 10	7 0
do 10.....	----	6 8	6 7	7 0	6 8	7 0
do 11.....	----	6 7	6 6	7 0	6 7	7 0
do 12.....	----	6 7	6 6	6 10	6 10	6 11
do 13.....	----	6 8	6 8	6 10	6 8	6 10
do 14.....	----	6 7	6 6	7 0	6 11	7 0
do 15.....	----	6 8	6 7	7 0	6 10	7 1
do 16.....	----	6 8	6 7	7 0	6 11	6 11
do 17.....	----	6 8	6 8	6 10	7 0	7 0
do 18.....	----	6 10	6 8	6 10	6 9	7 0
do 19.....	----	6 7	6 6	7 0	6 10	6 8
do 20.....	----	7 0	6 7	7 0	7 0	7 0
do 21.....	----	7 0	6 6	7 0	7 0	7 0
do 22.....	----	6 6	7 2	6 6	6 8	6 10
do 23.....	----	7 0	6 6	7 0	6 10	6 6
do 24.....	----	6 10	6 9	7 0	7 0	6 10
do 25.....	----	6 6	7 0	6 10	7 0	7 0
do 26.....	----	7 0	6 8	6 10	6 10	6 10
do 27.....	----	6 10	7 0	7 0	6 8	7 0
do 28.....	----	6 6	6 9	6 8	6 10	6 8
do 29.....	----	7 0	6 10	6 10	6 10	6 10
do 30.....	----	6 9	6 9	6 9	6 8	6 8

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ERIE CANAL.—Continued.

	May.	June.	July.	August.	Sept.
	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
Mitre sill, lock 31.....	6 6	6 7	6 7	6 6	6 7
do 32.....	6 1	6 7	6 8	6 10	6 8
do 33.....	6 8	6 10	6 8	6 9	6 10
do 34.....	7 6	7 0	7 3	7 0	7 0
do 35.....	6 7	7 0	7 0	7 0	7 0
do 36.....	7 0	7 0	7 0	7 0	7 0
do 37.....	7 0	7 0	7 0	7 0	7 0
do 38.....	7 0	7 0	7 0	7 0	7 0
do 39.....	7 0	7 0	7 0	7 6	7 6
do 40.....	7 0	7 4	7 6	7 0	7 0
do 41.....	7 0	7 0	7 0	7 0	7 0
do 42.....	7 2	7 0	7 2	7 0	7 0
do 43.....	7 0	7 0	7 0	7 0	7 0
do 44.....	7 0	7 0	7 0	7 0	7 0
do 45.....	7 0	7 0	7 0	7 0	7 0
do 46.....	7 0	7 0	7 0	7 0	7 0
Utica 9-mile level.....	7 2	7 3	7 2	7 0	7 0
Utica 60-mile level.....	6 8	6 9	6 9	7 0	7 0
Teft's waste weir.....	6 8	6 9	6 9	7 0	7 0
Rome.....	6 8	6 9	6 9	7 0	7 0
Fort Bull's waste weir.....	6 8	6 9	6 9	7 0	7 0

BLACK RIVER CANAL.

Lock No. 1.....	---	---	---	4 8	4 5
do 2.....	---	4 6	---	4 7	4 5
do 3.....	---	4 6	---	4 7	4 7
do 4.....	---	4 7	---	4 10	4 7
do 5.....	---	---	---	4 9	4 9
do 6.....	---	4 6	---	4 8	4 7
do 7.....	---	4 3	---	4 9	4 6
do 8.....	---	4 10	---	4 4	4 3
do 9.....	---	4 3	---	4 9	4 7
do 10.....	---	4 5	---	4 2	4 4
do 11.....	---	4 4	---	4 4	4 5
do 12.....	---	4 4	---	4 5	4 5
do 13.....	---	4 4	---	4 4	4 6
do 14.....	---	4 4	---	4 5	4 6
do 15.....	---	4 5	---	4 5	4 3
do 16.....	---	4 4	---	4 6	4 5
do 17.....	---	4 5	---	4 4	4 2
do 18.....	---	4 5	---	4 6	4 6
do 19.....	---	4 4	---	4 3	4 4
do 20.....	---	4 4	---	4 4	4 4
do 21.....	---	4 4	---	4 5	4 5
do 22.....	---	4 5	---	4 3	4 3

BLACK RIVER CANAL.—Continued.

	May.	June.	July.	August.	Sept.
	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
Lock No. 23		4 3		4 2	4 4
do 24		4 6		4 3	4 5
do 25		4 6		4 4	4 4
Upper aqueduct Lock No. 26		4 5		4 6	4 5
Lock No. 27		4 6		4 5	4 6
do 28		4 6		4 5	4 5
do 29		4 7		4 6	4 5
do 30		4 7		4 8	4 6
do 31		4 7		4 8	4 7
do 32		4 8		4 5	4 6
do 33		4 8		4 9	4 7
do 34		4 8		4 4	4 4
do 35		4 4		4 5	4 4
do 36		4 4		4 4	4 3
do 37		4 6		4 3	4 4
do 38		4 5		4 4	4 2
Level between combined lock No. 43		4 5		4 4	4 5
Level below combined lock No. 46		4 3		4 5	4 6
Lock No. 47		4 4		4 4	4 3
do 48		4 5		4 4	4 2
do 49		4 4		4 6	4 4
do 50		4 3		4 5	4 3
do 51		4 3		4 4	4 1
do 52		4 6		4 3	4 4
do 53		4 6		4 2	4 4
do 54		4 5		4 2	4 5
do 55		4 5		4 3	4 2
do 56		4 6		4 3	4 2
do 57		4 6		4 2	4 4
do 60		4 4		4 5	4 4
do 61		4 4		4 5	4 5
do 62		4 6		4 7	4 6
do 63		4 6		4 6	4 7
do 64		4 5		4 6	4 7
do 65		4 6		4 5	4 5
do 66		4 6		4 6	4 4
do 67		4 6		4 4	4 5
do 68		4 6		4 4	4 3
do 69		4 4		4 4	4 5
do 70		4 6		4 4	4 6
do 72		4 4		4 6	4 6
do 73		4 3		4 6	4 6

BLACK RIVER CANAL.—Continued.

	May.	June.	July.	August.	Sept.
	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
Lock No. 74	---	4 5	---	4 7	4 6
do 75	---	4 4	---	4 6	4 5
do 76	---	4 3	---	4 6	4 5
do 80	---	4 10	---	4 3	4 5
do 81	---	4 4	---	4 2	4 3
do 85	---	4 4	---	4 4	4 4
do 86	---	4 4	---	4 3	4 4
do 86	---	4 0	---	4 4	4 4
do 87	---	4 2	---	4 4	4 4
do 91	---	4 4	---	4 4	4 4
do 92	---	4 3	---	4 4	4 4
do 93	---	4 2	---	4 3	4 4
do 94	---	4 2	---	4 4	4 3
do 95	---	4 1	---	4 6	4 3
do 96	---	4 2	---	4 6	4 3
do 97	---	4 1	---	4 6	4 2
do 98	---	4 3	---	4 4	4 6
do 99	---	4 1	---	4 3	4 5
do 102	---	4 2	---	4 6	4 9
do 103	---	---	---	4 7	4 4
do 106	---	---	---	4 4	4 3
do 108	---	---	---	4 2	---
do 109	---	---	---	2 11	---
Feeder near State shop	---	---	---	4 6	4 6
Road bridge near Pitcher's	---	---	---	4 6	4 5
Mawkinsville	---	---	---	4 5	4 5
Lee's stop gate	---	---	---	4 5	4 4
Gosman's	---	---	---	4 3	4 3
W. weir below Feeder dam	---	---	---	4 3	4 3

CHAMPLAIN CANAL.

Section No. 1:					
50 ft. N. of lock 1, Mohawk,					
do south side river	5 8	4 3	4 6	4 3	4 3
Middle river	5 3	4 3	4 0	4 4	4 0
North side river	5 6	4 1	4 3	4 1	4 1
2 M. level, near Fulton's mill	6 0	5 0	5 0	4 9	4 10
Waterford bridge, Main st.	5 8	4 8	4 8	4 7	4 6
Foot of 3 locks	5 2	4 2	4 2	4 1	4 2
3¼ M. level, Cold Spring c'k.	6 0	5 6	5 6	5 5	5 5
Levenssees' creek	6 2	5 8	5 8	5 8	5 8
1½ M. level, Cole's waste weir	5 3	5 0	5 0	4 10	4 10
4 M. level, Mills' Swamp c'k.	4 10	4 6	4 6	4 3	4 2
Mechanicsville R. bridge	4 11	4 7	4 7	4 7	4 6
South of waste weir	5 0	---	---	---	---

CHAMPLAIN CANAL.—Continued.

	May.		June.		July.		August.		Sept.	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
Section No. 1:										
16 M. level, Becker's lock...	5	0	5	2	5	1	5	2	5	0
Demeny's culvert	6	1	6	0	5	11	6	0	6	0
Stillwater Upper creek	4	5	4	5	4	5	4	2	4	2
Hanny's bridge	4	7	4	6	4	4	4	3	4	2
Wilbur's Basin waste weir...	4	8	4	8	4	6	4	2	4	3
Colton's creek	4	6	4	4	4	4	4	3	4	3
Holmes' creek	4	9	4	6	4	5	4	4	4	4
Wilcox rock cut	5	4	5	0	4	11	5	0	4	11
Whalen's cut	4	8	4	8	4	8	4	8	4	8
Pond's logway	4	6								
Schuylerville aqueduct	5	6	5	5	5	6	5	6	5	4
Johnson's bridge	5	9	4	9	4	9	4	9	4	9
S. side Hudson river	6	11	5	7	5	7	5	0	5	11
Fort Miller bridge	5	9	4	5	4	5	4	4	7	0
N. side Hudson river	5	8	4	4	4	4	4	4	5	1
Waterford side cut apron, old lock			4	10	5	10	4	6	4	6
S. end side cut, lower end island			4	11	5	11	4	7	4	11
Section No. 2:										
2 M. level, extending from Saratoga to Bassett lock, entrance Tubb's brook...	5	0	5	0	5	4	5	4	5	4
400 ft. below Bassett lock...	4	6			5	4				
1 mile level, 200 feet below Stocum's bridge	4	6	5	0	5	0	4	11	4	8
3 M. lev., H. V. change b'd'ge	4	6	4	6	4	8	5	0	4	8
5 mile level, 1st bridge be- low Slate cut	4	6	4	7	4	8	4	8	4	5
12 mile level, ent. Glens Falls feeder	5	0	4	6	5	0	5	5	5	3
Upper lock Gl. Falls feeder.	4	6	5	0	5	0	5	0	5	0
3 M. level, Whitehall bridge	5	0	4	7	4	10	4	9	4	10
Dunham's basin	4	8	5	0	4	8	4	8	4	10
3 miles north of Dunham's basin, Summit level	5	0	5	0	4	10	4	8	4	10
60 rods S. b'ge, Smith's basin	5	0	5	0	4	7	4	8	4	10
2½ miles north Smith's basin, Summit level	5	0	5	0	4	8	4	8	4	10
Between locks at Fort Ann.	7	0	7	0	7	0	7	0	7	0
80 rods N. lower lock, Ft. Ann	5	6	5	0	4	10	5	0	5	0
S. of guard l'k, ½ mile in creek	5	0	4	6	4	6	5	0	5	0
5 M. level, 80 rods N. g'd lock	4	10	4	10	4	6	4	10	4	10
2½ miles south Whitehall...	4	10	5	0	4	6	4	10	4	10

TABLE

Showing the lockages for each month on the Eastern Division of the Erie canal and Champlain canal, commencing at the opening of the season and ending with the fiscal year.

	April.			May.			June.			July.			August.			September.		
	East.	West.	Total.	East.	West.	Total.	East.	West.	Total.	East.	West.	Total.	East.	West.	Total.	East.	West.	Total.
EASTERN DIVISION OF THE ERIE CANAL.																		
Lock No. 1, Albany.....	264	686	950	400	701	1,101	389	633	1,022	339	611	950	500	634	1,134
do 2, one mile from Albany..	625	1,117	1,742	697	1,066	1,743	749	912	1,661	698	839	1,537	956	827	1,783
do 3.....	1,905	2,295	4,200	2,242	2,051	4,273	2,481	1,952	4,433	2,518	2,138	4,656	2,292	2,208	4,500
West Troy side out locks.....	1,036	906	1,941	1,402	1,119	2,521	1,403	998	2,405	1,256	946	2,202	1,232	884	2,106
Port Schuyler side out locks.....	547	674	1,221	691	559	1,250	659	599	1,258	665	595	1,260	740	641	1,381
Alexander's lock, 3 miles west of Schenectady.....	1,724	1,992	3,716	2,104	1,997	4,101	2,157	1,665	3,822	2,033	1,748	3,781	2,290	2,059	4,349
Lock No. 32, Fort Plain.....	1,715	1,993	3,708	2,271	2,067	4,338	2,575	2,190	4,765	2,245	2,168	4,413	2,543	1,362	3,905
Lock No. 45, Frankfort, 9 miles east of Utica.....	1,832	2,279	4,111	2,497	1,961	4,458	2,109	1,984	4,093	1,983	1,748	3,686	2,526	2,199	4,725
CHAMPLAIN CANAL.																		
Old Junction lock.....	405	441	846	644	564	1,208	480	463	962	460	439	898	302	429	732
Waterford side out locks.....	392	455	847	297	432	649	177	261	438	120	130	250	193	248	441
Sloop lock.....	67	128	195	580	803	883	419	261	680	301	156	492	147	150	297	277	226	503
Lock No. 6, Fort Ann.....	390	378	768	414	440	864	341	297	638	329	313	642	257	334	586
Upper lock, Glens Falls feeder.....	239	284	523	300	260	560	280	230	510	245	182	427	257	202	459
Lock at Whitehall.....	398	430	818	442	485	927	343	332	675	252	343	694	292	318	610

REPAIRING THE CANALS BY CONTRACT.

The acts of 1854 and 1855 introduced, to some extent, a change in the method of making the annual repairs on the completed portions of the canals of the State.

Under the provisions of those laws two superintendent sections on the Erie canal, and various sections on the lateral canals were placed under contract for repairs for the term of five years by the Canal Commissioners.

The repairs of any unfinished portions or sections of the canals could not be let under the provisions of these acts.

The act of 1857 conferred upon the Contracting Board the whole power of making these repair contracts, and directed the board to place all the completed superintendent sections on any or all the canals of the State under such contracts for repairs, by letting the same to the lowest responsible bidder, and conferred upon the same board the discretionary power of placing under contract for repairs any incomplete or unfinished superintendent sections or portions of the canals then in progress of enlargement and completion.

Under the provisions of this act the Contracting Board has, from time to time, let the repairs of all the canals of the State by contract; as provided by said act these contracts are absolute and unconditional, and require the contractors to do all the work needful and required, and to furnish all the materials to keep and maintain the canals in good repair and navigable condition.

In some of the contracts on the lateral canals certain work, such as rebuilding locks, aqueducts and other mechanical structures are excepted out of the contracts, and with these exceptions the contracts cover every repair and expense known as an ordinary repair. Such is the intention of the act in question, and such are the terms of the contracts known and understood by the parties when executed by them.

And yet in many instances which come under the observation of the Commissioner, these contracts have not been complied with on the part of the repair contractors. They have failed on their part, to perform work which they were directed to do by the proper State authorities, and unfortunately, when the Canal Commissioner and the Contracting Board have endeavored to enforce the penalties of neglect, secured by the contractor's bonds, the Legislature has stepped in and passed acts for the contractor's relief, and in this way giving the public to understand that contractors

would be relieved from the conditions of their contracts and the penalties incurred by their non-fulfilment.

Under the former system of repairs by superintendents, there can be but little doubt at this day that improvidence and waste prevailed to a large extent if nothing more.

We have found, in bringing the Erie canal into use, with the full depth and width contemplated in the enlargement, that those portions of it supposed to have been completed prior to 1842, had not been cleaned out to bottom, from year to year, by the superintendents, as should have been done. The towing-paths were permitted to wear down and were not kept up to the proper height above the top of the water line. In fact no one acquainted with the subject could have supposed that one thousand dollars a mile and sometimes more, had been actually laid out and expended, in good faith, in the ordinary repairs of our canals.

This subject is one of great interest and importance to the State; and one in which the public feel a strong solicitude. The present system is surrounded with difficulties. The contractors will do no more work than they are forced to do, even of the character and description within the plain scope and meaning of their contracts. The locks are not tended and lighted as they should be, and as provided for by the contracts, and for the reasons above given it avails but little when an attempt is made to exact or force a compliance.

The attempt to place the canal, next spring, in good navigable condition, will probably be followed in some cases by abandonments by the contractors and the work thrown back upon the Commissioners.

LONG LOCKS.

The project of increasing the capacity of the Erie and Oswego canals for the transmission of tonnage by addition to the length of the present enlarged locks, and thereby enabling boats of a largely increased tonnage to navigate those canals, has, during the two past years, attracted considerable attention and excited some discussion in the Legislature as well as elsewhere.

On the eve of the entire completion of the enlargement and of fully testing or proving the capacity of our enlarged works with boats of suitable tonnage, the expediency and propriety of now commencing a further change in the original plan of construction which will, no doubt, involve a further outlay of more than one

million of dollars may well be questioned. The Commissioner believes it will not advance the welfare of the State.

If we take the number of lockages at different locks, during previous years, as a test of their ability to pass boats, we shall find that in 1860 the number of lockages for the season was considerably less than at former periods. At the Syracuse lock in 1850 the whole number of lockages for the season was 41,170; in 1860, 32,862. In 1857 the lockages at Alexander's lock, three miles west of Schenectady, were 43,957, and in 1860, 32,493. The total number of lockages to and from the Hudson river, in 1852, was 57,368; in 1860, 34,609.

At the Syracuse lock, in 1860, the greatest number of lockages in any one day was 246; daily average of the largest month, 170; daily average for the season, 142. At Alexander's lock the numbers were respectively 235, 174 and 140.

These comparisons and statements show that the present locks, while we are using boats of the largest capacity, that are now, and for years past, have navigated the canals, are able to pass at least fifty per cent. more tonnage than has heretofore been required of them. There were 2,854,877 tons delivered at tide water from the canals during the season of 1860. It is believed this amount may be increased 1,250,000 tons, with the enlargement fully completed and the locks in their present condition. In 1853 the tide-water deliveries were 2,505,797 tons, and the total movement on all the canals 4,247,852 tons, against 4,650,214 in 1860. One reason the immediate enlargement or lengthening of the locks is urged, is because at or near the close of navigation the greater relative portion of business is done upon the canals, and there is, with the great rush of business, frequent crowds of boats. It is therefore said that the canals are of insufficient capacity.

The rush of business would be as great, and crowds as frequent, if the locks were enlarged. The delays for higher rates of freightage and increased market prices would be greater, and the rush proportionately increased. The capacity of the canals is more than sufficient by one-half, and if the business upon them was properly distributed throughout the season of navigation there would be less rush and fewer crowds.

These facts lead the Commissioner to believe there is no immediate public necessity at this time to enter upon an increased expenditure in the way proposed, for the purpose of pro-

viding any immediate increased facilities for the transmission of property over the canals.

When the time shall come that the present enlarged canal, with the locks as they now are, shall be of insufficient capacity to deliver and transport all the freight that shall be required of them, then the subject of increasing the capacity of the canals in the way proposed, or by the addition of a third lock from Syracuse to Albany, and a second from Syracuse to Buffalo; and in certain localities a towing path on each side of the canal may be advantageously considered.

Removal of the Benches from the Canal.

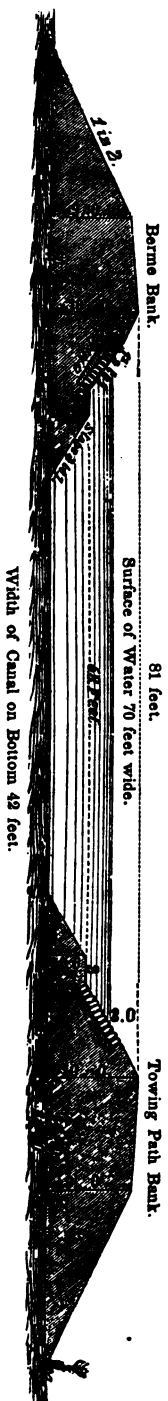
The original plan for enlarging the Erie canal, and the plan upon which a large portion (all prior to 1848) was enlarged, was by building the slope wall on a bench of earth, from three to four feet in height from the bottom of the canal, as shewn in fig. 1, only leaving room for two boats to pass each other. This bench still remains on a large portion of the Eastern Division of the Erie canal, and the continual washing of the water and the rubbing of the passing boats has in many places worn the benches down and filled the centre and bottom of the canal, allowing hardly sufficient room for the passage of the large class boats of to-day. Portions of these benches have from time to time been removed, but there still remains upon this division about fifty miles.

The cost of the removal of these benches and the reconstruction of the slope wall to the bottom of the canal, upon the plan adopted by the Canal Board in 1848, as shown in fig. 2, would, by the estimate of W. B. Taylor, division engineer, cost about \$9,000 per mile.

It is a work that should be done as early as funds can be had for that purpose. It would add to the capacity of the canal nine or ten percent., and it would remedy those delays of so frequent occurrence caused by large class boats, while waiting for lockage or change of horses, swinging across the canal and grounding upon both benches, making jams and crowds, and detaining navigation until they can be released, either by raising the water in the level above its usual height or otherwise. Late in the season and near the close of navigation, when boats are impeded by ice and every effort is being made to get them through, the canal becomes choked with ice at these points, and does not

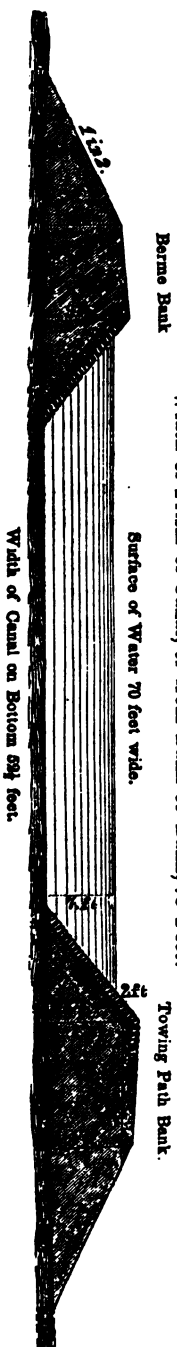
No. 1.

Width of Prism of Canal, or from Bank to Bank, 81 Feet.



No. 2.

Width of Prism of Canal, or from Bank to Bank, 76 Feet.



The existing contracts for new locks and other work will consume the whole of this amount, and as there are now remaining not yet enlarged the locks at Fort Miller, Moseskill and Fort Edward, with large portions of the prism of the canal, the undersigned would recommend a further appropriation for this canal of fifty thousand dollars, the present year, so that the enlargement, where most needed, may be completed as soon as possible.

During the past year a weighlock at Waterford has been in course of construction, and will be complete before the opening of navigation next spring. This lock will relieve the weighlock at Troy, which has heretofore weighed the boats for the Champlain canal besides the Erie canal boats, and is usually much crowded.

It may not be amiss to call the attention of the Legislature to some parts of the report of the Commissioners for last year, which was not printed until rather late in the session of that body, and was consequently passed over.

"There is at times considerable delay, and great inconvenience resulting from the collection of boats at and about the locks where they pass to and from the Erie canal and Hudson river, at West Troy. Large numbers of boats ascending the Hudson river arrive at this point together, and where they meet, as frequently is the case, numerous boats descending from the canal, there is a crowd, confusion and delay, which can only be prevented by providing more room for the mooring of the boats until there is time to pass them. As providing this room will require the appropriation of some additional land, and as such land may increase in value hereafter, the undersigned would recommend the passage of a law, authorizing the Canal Board to make such appropriation, leaving the work to be completed according to the necessity and the condition of the canal finances."

At the side-cuts at West Troy there is but a single lock in each side-cut leading to the river. These locks can, of course, pass boats no faster than any single lock on the canals, and as the canal elsewhere has two locks, it would be well to double one or both of these side-cut locks, and so be able to clear the canal from boats passed down from the Champlain and Erie canals with twice the present rapidity, and with the same ease and rapidity that they are passed over other portions of the

canals, and avoid many of the crowds which occasion so much complaint and inconvenience.

The building of a new lock at either or both side-cuts need not obstruct the working of the present locks, and one or more locks might be finished before the close of the season, if commenced next spring.

Again may we congratulate ourselves, at the close of the present year, upon the increased and increasing business of the canals, the past favorable season, the few delays in navigation, the comparatively small amount expended for the maintenance of the canals, and upon the largely increased amount of tolls collected.

The canals have, thanks to the efficiency, energy and promptness of the superintendents, engineers and other officers connected with them, and to the past fortunate season, been navigable, from the opening in May last to the present time, with an unusually small number of delays and accidents, and those arising from causes which could be neither foreseen nor avoided.

It is hoped that in future fortune may favor us as in the past year, that the canals may prosper and increase in business, and become, as was expected at the time of their construction, sources of profit and revenue to the State.

W. I. SKINNER.

Dated ALBANY, Oct. 1, 1861.

MIDDLE DIVISION.

The Commissioner in charge of the Middle Division respectfully submits the following

REPORT :

(He was elected by the Legislature on the 16th day of January last, to fill the vacancy occasioned by the death of Samuel H. Barnes, who was chosen in November, 1860, and deceased before the first day of January.)

The Middle Division embraces the following canals, viz :

	Miles.
1. The Erie canal from Higginsville, Oneida county, to the county line between Seneca and Wayne counties, including Limestone, Butternut, and Nine-Mile Creek feeders, each navigable one mile.....	71.93
2. The Oneida Lake canal, including towing-path on Wood creek, six miles, the Oneida feeder, falling into the canal at Durhamville, and navigable one mile	7.
3. The Oswego canal	38.
4. Oneida River improvement.....	20.
5. Seneca River towing-path.....	5.75
6. Seneca River improvement, at Baldwinsville, including three-quarters of a mile of canal slack water navigation, without any towing-path from Baldwinsville to Jack's reef.....	12.50
7. Cayuga and Seneca canal	22.77
8. Cayuga inlet.....	2.
9. Crooked Lake canal.....	8.
10. Chemung canal.....	23.
11. Chemung Canal feeder.....	16.
12. Chenango canal	97.
Total	<u>323.95</u>

The Middle Division embraces also, the following reservoirs:

	Areas, acres.	Altitude, acres.	Depth, feet.	Length of feeder, miles.	
Erieville	340	46	21½	20	
Hatch's lake.....	134	15	10	98	to Bradley Brook reservoir.
Eaton brook.....	254	60	50	8	
Bradley brook ..	134	30	25	3	to Eaton brook feeder.
Leland pond.....	173	13	8	½	
Woodman's lake,	148	18	11	¼	
Madison brook..	235	55	45	2	
Skaneateles	8,320	6	--	9	
Cazenovia lake..	1,778	--	4½	10	

The Erieville reservoir is used as a feeder to the Erie canal. It is located in the town of Nelson, Madison county, and is discharged through Nelson creek into the Chittenango creek, at the village of Cazenovia, and thence through the creek and Chittenango feeder, into the canal at Chittenango landing, 18 miles east of Syracuse. The waters of the Cazenovia lake reservoir also pass to the Erie canal, through the Chittenango creek, and Chittenango feeder, a distance of ten miles.

In January last the Canal Board authorized the construction of a new reservoir, (called the De Ruyter reservoir,) to supply the west end of the long level of the Erie canal with water. The work was advertised by the Contracting Board, and the contract for its construction awarded to Messrs. De Graw & Wood, who entered into contract on the 29th day of March last. The reservoir is located at the head waters of Limestone creek, and on the division line separating the counties of Madison and Onondaga. It embraces portions of the towns of De Ruyter and Cazenovia (Madison county), and the town of Fabius (Onondaga county). Its flow covers 626 acres of land, and has a capacity of 500,000,000 cubic feet of water. The estimated cost, when completed, is \$80,000. In addition to the Limestone creek the reservoir will receive the flood waters of the Tioughnioga river which will be turned from their present course, the Susquehanna.

The reservoir will discharge into Limestone creek, which feeds the canal six miles east of the city of Syracuse, and it is confidently believed will afford an abundant supply of water at a point

on the canal where for years past the want of a larger quantity of water has been a great hindrance to good navigation.

The time fixed for the completion of this work was the first day of November last. Though the contractors have been diligent and faithful, and have kept a large force steadily employed during the season, it cannot be fully completed this year. It will have been so far completed before the close of the current year as to fill at the dam to a depth of about forty feet.

The amount expended up to the close of the fiscal year, (September, 30,) is, \$31,330.

ENLARGEMENT OF THE ERIE.*

The cost of completing the enlargement of the Middle division of the Erie is	\$16,505 74
Cost of completing the De Ruyter reservoir	48,670 00
Total	<u>\$65,175 74</u>

The "enlargement" work remaining to be done is chiefly on the Montezuma marshes, to which reference is made in another part of this report.

REMOVING OBSTRUCTIONS FROM SENECA RIVER.

The balance of appropriation unexpended at the date of the last report was \$3,500. This amount has been expended during the present year upon that portion of the work lying between toll bridge and mouth of the Canandaigua. The present condition of the work may be briefly stated as follows :

The old towing-path, bridge abutments, etc., are removed from the river channel ; a new cut, one hundred and fifty feet in width, has been made south of the canal to convey the waters of the Canandaigua into Seneca river. The entrance and discharge way of the aqueduct has been sufficiently enlarged.

A channel one hundred and fifty feet wide and of sufficient depth has been completed for most of the distance between the aqueduct and toll bridge ; and a channel one hundred feet wide has been completed for a larger portion of the distance between toll bridge and mouth of Canandaigua outlet, or end of the original contract and plan of work.

* When speaking of "enlargement," in this report, the writer desires that it should not be inferred that the canal is not yet enlarged to the full width of seventy feet. While the full width, and in most cases the full depth of seven feet are fully attained, yet there is much to be done, at the points mentioned, in completing the banks and slope walls.

The amount required to complete the work on the original plan is about 30,000 cubic yards of excavation, and is estimated to cost \$4,500.

In December 1859, and during the progress of this work, the Board of Canal Commissioners authorized the extension of the contract and work from the mouth of the Canandaigua down to the railroad bridge—a distance of ninety-seven chains. During the summer of 1860, one channel, thirty feet in width, was excavated for the entire distance; and an additional cut made, of the same width, for about two-thirds of the distance. The total amount expended upon this portion is \$7,163.

The resident engineer in his report to the Canal Commissioner, as shown last year, took the view that the object of authorizing the work below the outlet of the Canandaigua was to complete a channel from the junction of the Canandaigua, above the aqueduct to the marsh work below, (commencing at the railroad bridge and running down, known as the work of "draining the Cayuga marshes,") and make the whole available, and not to leave a "*hiatus*" on the short distance between the outlet and railroad bridge. He reported accordingly as follows: "In my judgment, nothing short of a channel 150 feet wide to the outlet, (Canandaigua), and 100 feet from that to the railroad bridge, put down to the aqueduct floor at the upper end and brought to the marsh work now (then) in progress below will do."

If this work was added by the Canal Commissioners having in view this improvement as the engineer supposes, then it will require a farther appropriation of \$25,320 to complete the whole and make it available on that plan.

ENLARGEMENT OF THE OSWEGO.

The sum required to complete this canal is estimated at \$16,896.61. The work remaining to be done is chiefly confined to three sections, each being under contract.

Final surveys for property maps, in claims for land damages consequent upon the enlargement, are in progress, many of them having been completed.

The immediate construction of a weigh lock in the city of Oswego, is earnestly recommended. The importance of this measure, to those familiar with the business of the Erie and Oswego canals, (which canals are united at the Syracuse weigh lock,) cannot be doubted. The weigh lock at Syracuse is incapable of

performing all that is required of it by these two great thoroughfares, without causing serious detention to boats.

The resident engineer has prepared a plan and estimate for a weigh lock at Oswego, locating it at the side of guard-lock No. 6. The plan provides for its construction in such a manner as to make it available as *one* of a tier of *double* locks,—a future necessity by no means of doubtful utility. The estimated cost for said lock is as follows :

Cost of the lock	\$26,000 00
Cost of building.....	8,500 00
Cost of scale.....	4,500 00
	<hr/>
Total.....	\$39,000 00
	<hr/> <hr/>

REPAIRS OF THE CANALS.

The following shows the names of the repair contractors on the Middle Division, the date of contract and continuance of the same, together with their location and compensation.

Canal.	Contractor.	No. of section.	Date of contract.	Expiration of contract.	Contract price.
Erie -----	Thomas Gale -----	7	May 1, 1861	Apr. 30, 1866	\$3,490 00
do -----	Lewis Selye -----	8	Oct. 1, 1859	Sept. 30, 1862	7,000 00
do -----	Charles J. Hayden -----	9	May 1, 1861	Apr. 30, 1866	7,000 00
Oswego -----	Henry D. Denison -----	1	May 1, 1859	Apr. 30, 1862	2,800 00
do -----	Stinson Ostrander -----	2	Feb'y 1, 1859	Jan. 31, 1862	12,899 00
Cayuga and Seneca -----	John Ecker -----	All.	June 1, 1861	May 31, 1866	4,490 00
Chemung and feeder -----	Thos. W. Armsbury -----	All.	Feb'y 1, 1859	Jan. 31, 1862	13,475 00
Chenango -----	A. Peck & Co. -----	1	May 1, 1861	Apr. 30, 1866	13,990 00
do -----	John P. Smith -----	2	Oct. 1, 1860	Sept. 30, 1865	5,600 00
do -----	Josiah Brintnall -----	3	May 1, 1861	Apr. 30, 1866	7,000 00
Oneida Lake -----	Wm. R. Chapman -----	All.	Oct. 1, 1860	Sept. 30, 1865	2,375 00
Crooked Lake -----	Homer W. Randall -----	All.	do do	do do	3,869 00
Total per annum -----					\$83,988 00

RESIDENCY No. 5.

M. S. KIMBALL, *Resident Engineer.*

Consists of seventy-six miles of the Erie canal, extending from Higginsville to the east line of Wayne county.

REPAIR SECTION No. 7.

THOMAS GALE, *Contractor.*ARCHIBALD HESS, *Superintendent.*

This section was awarded to the present contractor on the 12th day of April last for five years from the 1st of May, 1861, for \$3,490 per annum. It embraces twenty-seven miles of the Erie canal, extending from its junction with the Oneida lake canal at Higginsville to the Limestone creek feeder; the Oneida creek feeder, two miles in length, and navigable from Durhamville to Oneida, a distance of one mile; and the Erieville and Cazenovia lake reservoirs and Chittenango feeder. Total, 29 miles.

The structures are :

- 2 aqueducts,
- 23 culverts,
- 1 wooden lift lock (Oneida feeder),
- 3 wooden farm bridges,
- 5 iron road bridges,
- 15 wooden road bridges,
- 1 guard gate (Oneida feeder),
- 3 waste weirs,
- 3 feeder dams,
- 2 guard gates.

On the 28th day of January last, an estimate in detail was made by the resident engineer, and sent to each of the repair contractors of the Erie and Oswego canals, exhibiting to each contractor the amount of work he would be required to do under his contract before the opening of the canals, and directing him to commence work at those points where there was the largest accumulation of earth or sediment to be taken out, and consequently the least ice to remove. For copy of such instructions see Appendix A.

Up to the 19th of February nothing had been done. It is sometimes the case that repair contractors are disposed to postpone the commencement of the work of spring repairs as late as possible, while the day appointed for opening the canals is but

seldom, if ever, postponed. On the appointed day the canals *must be filled*, whether the "bottoming out" has been done according to contract or not. Then, if the contractor has not "had time" to do his work, he is perhaps "sorry;" while his negligence is the occasion of still greater sorrow and hindrance to forwarders and boatmen.

On the day last mentioned (February 19) the contractors were again addressed, and notified that they would be required to *commence* the work on the 25th day of the same month, with a force sufficient to ensure the *completion* of their work by the day appointed for the opening of the canals. (See Appendix B.) The 28th day of February arrived, and on this section (No. 7) nothing had been done. The resident engineer therefore reported that under the contract the repairs were "not promptly and properly made." The Contracting Board thereupon unanimously declared the contract "abandoned," on the 5th day of March, and ordered the section advertised for three weeks (as the statute requires), which advertisement required the person to whom the contract should be awarded, to take possession of the section on the day the canals were to be opened, May 1.

At this juncture the section was put under contract for "spring repairs," in pursuance of chapter 495, Laws of 1859, at prices fixed by the resident engineer, and approved by the Commissioner, Thomas Gale, contractor. The work was done according to the contract, and consequently *well* done.

The cost of the repairs made under this contract were as follows :

Amount chargeable to "Construction Account".....	\$21,321 25
Amount chargeable to "Ordinary Repair Account".....	14,568 36

Total cost.....	<u>\$35,889 61</u>
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For many years the Oneida Creek feeder has failed to deliver an amount approximating to its full supply of water, owing, in part, to the dilapidated condition of the bulkhead and dam on the creek above the village of Oneida. The plan of the structures was made with a view of supplying the old canal, and was found of too small compass to be of material service after the enlargement. A new bulkhead and dam on an enlarged and improved plan have been constructed, the extra cost of which has not yet been fully ascertained.

The feeder has been thoroughly "bottomed out," and the flow of water will be unobstructed, except, perhaps, the slight impediment of low banks. The banks should be raised and strengthened next season.

Early in the season the resident engineer was directed to make an examination of the canal banks at Brandy brook, near Durhamville, and report; also to make an estimate of the cost of thoroughly securing them against any failure. It was at this point that a large and expensive break occurred a few years ago, and the engineer reported that there were equally as bad indications as preceded that break, and made an estimate amounting to \$5,080. The subject was laid before the Canal Board, and resulted in the appointment of a committee from that Board who recommended the expenditure of but \$600, and that amount to be applied in securing a couple of culverts embraced in the estimate thus leaving the banks of Brandy brook in the same condition as before. These banks should at once receive attention.

The repairs recommended by the committee have been made.

New bridges at Durhamville and Manlius have been built. They are constructed after the "Beardslee plan," of iron cords, and are regarded as an improvement over wooden cord bridges. The cost to the State, for both, was \$1,172.63.

REPAIR SECTION No. 8.

LEWIS SELYE, *Contractor.*

ARCHIBALD HESS, *Superintendent.*

This section extends from Limestone Creek feeder to lock No. 50, above Geddes, including Limestone and Butternut feeders, each navigable one mile. Total 13 miles. The contract price per annum is \$7,000.

The structures are:

- 3 double stone lift locks,
- 2 aqueducts,
- 4 culverts,
- 1 weigh-lock,
- 1 wooden farm bridge,
- 3 wooden feeder bridges,
- 1 wooden tow-path bridge,
- 9 wooden road bridges,
- 2 iron tow-path bridges,
- 7 iron road bridges,
- 1 iron foot bridge,

- 1 feeder dam,
- 1 waste-weir,
- 3 lock houses.

In relation to this section Resident Engineer Kimball writes:

"At the general suspension in 1842, much of the section work at and near Syracuse was so nearly done that it has never been relet. It was expected, moreover, that the superintendents would, from time to time, do something towards its completion. There being no call for it by reason of the increased draft of boats, till since the repairs have been let by contract very little was ever done.

"To provide for the full depth of seven feet, at the opening last spring, the contractor was ordered to do this work. He bottomed out the largest part of it, which so far has cost \$14,461.17. Changes, authorized by the Canal Board, were also made by substituting vertical walls in place of the old bench and slope walls, at Syracuse, amounting to \$8,139.57. There is considerable more bottoming of this nature still to be done, and for the convenience of the forwarding as well as the navigating interests, the remaining old bench walls should be removed, and either vertical walls substituted or slope walls, commencing at canal bottom and conforming to slope walls on other portions of the canals built."

On the first of August the discharge culvert, leading from the weigh-lock and crossing under the canal, became undermined. The water in the canal forced a passage down outside of the arch, and gained entrance to the culvert by forcing up the floor inside. In consequence of being undermined the arch was broken and fifty or sixty feet of the culvert settled.

Navigation was consequently delayed about three days, during which time very strong coffer dams were thrown across the canal at the ends of the weigh-lock wall. The level having been drawn down was again filled and navigation resumed—boats passing through the weigh-lock instead of the canal channel.

The repair of culvert was a tedious and troublesome work, occupying about thirty days. It was thoroughly overhauled, the old floor replaced, a new floor placed over the old one, and the two firmly secured by heavy iron bars bolted to the foundation timbers. The whole arch of the culvert was then covered with concrete to the thickness of two feet. A heavy cement, vertical wall, was built on the tow-path side, from canal bottom to the top of the bank, connecting with the arch of the culvert at the

crossing. As now constructed, another failure of the culvert at this point is next to impossible. The cost to the State for the repairs is \$7,128.13.

In this case a question as to the liability of the repair contractor presented itself. If the risk was increased after the execution of the contract,—and it appears by the annexed certificate it was,—the liability of the State to pay for said repairs appears conclusive. A map showing the condition of the culvert both previous and subsequent to the break was made and filed in the Canal Department; to which was attached a certificate, of which the following is a copy :

“ We hereby certify that in our opinion the removal of the earth bank and slope wall over the Syracuse weigh-lock culvert, at Syracuse, and the substitution of the vertical wall, was the cause of the break in said culvert of August 1, 1861. By reference to the plan, it will be seen that the puddled gravel was not originally carried under and where the vertical wall was built. This was found to be so upon clearing out and repairing.

M. S. KIMBALL, *Resident Engineer.*

W. W. JEROME, *1st Ass't. Engineer.*

ARCHIBALD HESS, *Superintendent.*

SYRACUSE, October 15, 1861.”

This subject is again referred to in a subsequent part of this report, in connection with a letter from the Auditor of the Canal Department.

REPAIR SECTION No. 9.

CHARLES J. HAYDEN, *Contractor*; ARCHIBALD HESS, *Superintendent.*

This section extends from the foot of lock No. 50, to the east line of Wayne county; embracing the Skaneateles lake and feeder, and the Camillus feeder, navigable one mile,—total 35 miles.

This section was awarded to the present contractor on the 12th day of April, for five years, from the first day of May, 1861, at an annual contract price of \$7,000.

The structures are :

3 double stone lift locks,

6 aqueducts,

2 waste weirs,

6 culverts,

1 wooden change bridge,

- 11 wooden road bridges,
- 6 wooden farm bridges,
- 11 iron road bridges,
- 1 iron foot bridge,
- 2 guard gates,
- 4 feeder dams,
- 3 receivers.

A. M. Root was the contractor on this section until the 2d day of March last, when he abandoned his contract; and on the fifth day of the same month the Contracting Board declared the contract abandoned. Precisely the same letters as detailed in appendix marked A, B and C, and sent to contractors on sections Nos. 7 and 8, were sent to him. This section (like section 7,) was immediately advertised by the Contracting Board to be re-let,—the contract to take effect on and after the first day of May. Meanwhile the section was put under temporary contract for spring repairs (in accordance with the statute before referred to,) with James J. Belden, at prices fixed by Resident Engineer Kimball, and approved by the Canal Commissioner. A very large amount of work was done on this section, and the canal put in good condition, by the opening of navigation. During the entire season navigation has been uninterrupted. The cost is as follows:

Amount chargeable to "repair account".....	\$36,188 56
Amount chargeable to "construction account"	15,307 31
Removing bench, and constructing slope wall, as per order of Canal Board.....	2,741 33
Total.....	<u><u>\$54,237 20</u></u>

In speaking of this section and the large amount of work done, Engineer Kimball, in his report, says: "The 'Jordan level' (embraced in this section) is, for the greater part, through a swamp. It had never been bottomed out, either by State Superintendent or repair contractor. For nine miles the slope wall on both sides is built on what is known as a 'bench,' which is simply this: starting the slope wall on an earth bench four feet above canal bottom.

"It is the sliding in of this bench—in many places the walls going with it—that had so much filled up the level, as to make the bad navigation of former years. It must not be forgotten

now, that the work of bottoming out last spring, even at the large cost shown, has had nothing to do with the removal of the old earth bench, except so far as the expenditure of the \$2,741.33, authorized by the Canal Board, is concerned."

The large expenditure for "spring repairs" on this section, as well as on section No. 7, was rendered necessary in consequence of the neglect, year after year, of the repair contractor to "put and keep" the canal in the "good condition" required by his contract. Neither this, or section No. 7, had been fully bottomed out since their enlargement was *declared* completed; and in many, very many, places the bottom was left by the enlargement contractors from *four to ten inches above the "base or bottom line."* The "Jordan level" (on sec. 9), in its enlargement, was declared completed more than fifteen years ago, and until last spring "had never been bottomed out, either by the State Superintendent or repair contractor." With the constant sliding of the "bench," together with other accumulation in the bottom of the canal for so long a period—filling in some places to a depth of twelve to fifteen inches—is it wonderful that that level, on which boats have lain aground for days successively, year after year, became the subject of dread and complaint by both boatmen and forwarders? If repair contractors and superintendents are suffered to and do neglect for ten or fifteen years to bottom out their respective sections, is it surprising that it costs the State as much to do the work in one year as it has paid the contractors during fifteen years for *doing* what they have *not* done? During the entire season the navigation of the "Jordan level" has been good, and not a single complaint has reached the Commissioner from any quarter.

The old bench has been and continues to be the cause of much difficulty and expense. The earth composing it is constantly being washed away by the action of the water, which causes large "slides" of the slope wall to find resting places in canal bottom. Is it a matter to be considered, in point of economy, whether at once to authorize the remodeling of these walls, or to longer contend with the failure of both the walls and the earth benches?

Considerable "extra work" has already been done, and much more is required, to secure the banks, once completed, on the Montezuma marshes. In several instances the banks have split, lengthwise and through the centre, the rear half sliding down a

distance of five to seven feet, leaving barely a width of towpath sufficient for the passage of a horse. The cause appears to be the decay of the muck upon which the whole canal is built, and possibly some may have been put in the rear slope of the banks, which, of course, cleaves off. Much the same difficulty is experienced at the wide water east of Montezuma village, and it is believed that all the banks built upon the marshes will sooner or later be the occasion of serious difficulty, in consequence of settling, owing to the want of a more solid foundation. Much of the difficulty can be remedied by the free use of brush and stone at the foot of the slope, before filling up the banks anew.

IMPROVEMENT OF THE OWASCO OUTLET.

Nothing has been done upon this improvement during the year. To complete it permanently will require an appropriation of about \$7,000.

DRAINING THE CAYUGA MARSHES.

The Legislature of 1853, by act, chapter 178, authorized the drainage of Cayuga marshes, and placed the work in charge of the Canal Commissioner.

The amount appropriated by the Legislature for this work, up to	
January 1st, 1858, was.....	\$175,000 00
Amount expended for the same was.....	169,008 14
Balance unexpended.....	<u>\$5,991 86</u>

At the close of the year 1857, the main cut or principal channel at Jack's Reefs was substantially completed one hundred feet wide and six feet below lowest water, and the excavation of the bars between that point and the bridge of the New York Central railroad (direct line,) on the Cayuga marshes, was put under contract to L. L. Lowell, in December of that year, at an estimated cost upon the plan then contemplated of \$17,398.60.

Various changes were made in the plan of the work during its progress in the years 1858 and 1859, very largely increasing the cost.

The following table exhibits the plans and costs upon the several bars as originally designed, as increased in the course of construction, and as finally adopted in 1860 for completing the work :

TABLE.

NUMBER OF BAR, OR ITEM OF WORK.	Upon plan of contract.				Upon plan as increased in course of construction.				Upon plan as recommended in present report.			
	Size of cut.	Cubic yds. of excava- tion.	Price.	Amounts.	Size of cut.	Cubic yds. of excava- tion.	Price.	Amounts.	Size of cut.	Cubic yds. of excava- tion.	Price.	Amounts.
Skaneateles outlet, No. 1.....	20×10	800	26	\$208 00	20×10	1,000	26	\$260 00	60×10	2,500	26	\$650 00
Ronta's bridge, 2.....	20×10	3,000	26	780 00	20×10	3,000	26	780 00	60×10	8,000	26	2,080 00
Above Barton's, 3.....	20×10	1,200	26	312 00	20×10	1,000	26	260 00	60×10	3,500	26	910 00
Weedsport, 4.....	20×10	900	26	234 00	60×12	10,000	26	2,600 00	60×12	12,000	26	3,120 00
Hickory island, 5.....	40×10	10,500	20	2,100 00	60×13	50,000	20	10,000 00	60×13	50,000	20	10,000 00
At bridge, 6.....	20×10	1,000	26	260 00	20×10	1,500	26	390 00	60×10	5,000	26	1,300 00
Mosquito point, 7.....	60×10	33,000	15	4,950 00	100×10	38,000	15	5,700 00	100×10	40,000	15	6,000 00
Howland's bridge, 8.....	20×10	1,000	26	260 00	20×10	1,000	26	260 00	60×10	3,000	26	780 00
Campbell's island, 9.....	20×7	4,400	26	1,144 00	20×9	12,000	26	1,920 00	60×8	16,500	26	4,290 00
Railroad bridge, 10.....	20×7	25,500	26	6,630 00	20×9	70,000	26	18,200 00	60×8	95,000	26	24,700 00
Totals.....				\$16,878 00				\$40,370 00				\$53,830 00
Add 10 per cent. for contingencies				1,687 80				4,037 00				5,383 00
				\$18,565 80				\$44,407 00				\$59,213 00

[Assem. No. 9.]

ANNUAL REPORT OF THE

The following Table exhibits the total quantities and cost at contract prices, upon the plan recommended in the Report of 1859, and the quantities and amounts paid for work done up to December 30th, 1861, with the average width of channel and depths below low-water mark of Geddes' survey.

NUMBER OF BAR, OR ITEM OF WORK.	Plan of work as adopted.					Amount of work done up to Dec. 31, 1861.					Amount remaining to be done.	
	Length of bar.	Size of cut.	Cubic yds. of excavation.	Price.	Amounts.	Length of cut.	Size of cut.	Cubic yds. of excavation.	Amount.	Cubic yds. of excavation.	Amount.	
Skaneateles outlet, No. 1.....	600	60×10	2,500	26	\$650 00	.....	.....	.....	.....	2,500	\$650 00	
Bonta's bridge, 2.....	1,800	60×10	8,000	26	2,080 00	.....	.....	.....	.....	8,000	2,080 00	
Above Bonta's, 3.....	900	60×10	3,800	26	910 00	.....	.....	.....	.....	3,800	910 00	
Weedsport, 4.....	800	60×12	12,000	26	3,120 00	.....	.....	.....	.....	12,000	3,120 00	
Hickory island, 5.....	4,000	60×13	50,000	20	10,000 00	.....	.....	.....	.....	50,000	10,000 00	
Free bridge, 6.....	1,700	60×10	5,000	26	1,300 00	.....	.....	.....	.....	5,000	1,300 00	
Mosquito point, 7.....	2,300	100×10	40,000	15	6,000 00	.....	.....	.....	.....	40,000	6,000 00	
Howland's bridge, 8.....	400	60×10	3,000	26	780 00	.....	.....	.....	.....	3,000	780 00	
Campbell's island, 9.....	2,100	60×8	16,500	26	4,290 00	.....	.....	.....	.....	16,500	4,290 00	
Railroad bridge, 10.....	10,500	80×8	95,000	26	24,700 00	.....	.....	.....	.....	95,000	24,700 00	
Totals					\$53,830 00			125,092	\$27,277 14	118,415	\$28,592 14	
Add 10 per cent. for contingencies					5,383 00							
Deduct amount done.....					\$59,213 00							
Balance to complete					\$27,277 14							
					\$31,935 86							

There has been appropriated by the Legislature and expended on construction for this work, up to September 30th, 1861, about \$197,000.

To complete the same upon the enlarged effective plan adopted in 1860, will require a further appropriation of \$35,000.

The undersigned is not sufficiently conversant with the details, either of the general plan of work, or of the methods by which the greatest benefits in the reclaiming of lands or of sanitary improvements can be attained, to justify him in urging any special action at this time by the Legislature. The work is nearly completed, and but little benefit, comparatively, can accrue until the cuts are entirely done. It would seem sound policy to appropriate the proportionately small balance required for finishing the improvement, and realize in some measure the benefits from the large expenditure already made.

RESIDENCY No. 6.

M. S. KIMBALL, *Resident Engineer.*

Embraces the Oswego canal from Oswego to Syracuse, 38 miles; the Oneida River improvement from Three River Point to Brewerton, 20 miles; the Oneida Lake canal from Oneida Lake to Higginsville, on the Erie canal, 6 miles; the Seneca River towing-path, $5\frac{3}{4}$ miles; Baldwinsville canal, $\frac{3}{4}$ of a mile; and pond above to Jack's Reefs, 12 miles; total, $82\frac{1}{2}$ miles.

REPAIR SECTION No. 1.

HENRY D. DENISON, *Contractor.* ROBERT S. KELSEY, *Superintendent.*

This section extends from Syracuse to Three River Point, and includes the Seneca River towing-path and Baldwinsville canal. Total $21\frac{1}{2}$ miles. Contract price per year \$2,800;—contract expires April 30th, 1862.

The structures are :

- 4 stone lift locks,
- 1 composite lift lock,
- 1 wooden lift lock,
- 1 wooden guard-lock,
- 4 composite culverts,
- 5 iron road bridges,
- 1 iron change bridge,
- 11 wooden road bridges,
- 4 wooden change bridges,

- 2 floating tow-path bridges,
- 1 wooden river dam,
- 2 waste weirs,
- 4 lock houses,
- 1 State shop.

During the latter part of the season two breaches occurred at lock No. 5 ("Mud lock"), the details of which are found in the following report from Resident Engineer Kimball:

RESIDENT ENGINEER'S OFFICE, }
FULTON, Sept. 16, 1861. }

Hon. B. F. BRUCE, *Canal Commissioner*:

Sir—According to your directions I have the honor to submit the following report:

Without any previous warning, Mud lock, on the Oswego canal, at the foot of the Liverpool level, seven miles below Syracuse, suddenly gave out on the morning of the 9th of August. The level above was immediately drawn off, a slow process, by cutting through the berme bank above, and a coffer dam put in at the upper end of the lower recess, and the lock bailed out.

It was found that the water had entered at the upper end of the berme wall, passing partly under and partly around it, coming out into the lock and bursting up the floor about 30 feet below the upper gates.

The repair was made by cutting out the earth at the head, extending to the rear of the walls each way, and filling under the broken wall with concrete and grout, filling the spaces between the timbers inside, and replanking with two new courses.

The berme wall at the head was also concreted for three feet in thickness, and the whole remaining space both sides puddled up with the best gravel puddle. During the repairs the berme wall cracked in two from top to bottom, settling down in front, opening the joints in the masonry from one to two inches. The repair was completed, however, and boats commenced locking the following Tuesday.

The lock appeared to be standing well and growing every day more permanent, when as suddenly a second breach occurred on the morning of the 22d, the water following the towpath wall, and bursting into the lock at the same point as before.

A much larger gap was this time cut through the bank above; but the emptying of the level was slow indeed. The coffer dam

was put in near the foot of the lock, in the curve of the wings. All seemed to be going on well till the lock was nearly pumped out, when it was discovered that water was coming in from the river, and of course under the floor. Very soon the bank broke down in rear of the lower gate. Pumping was immediately suspended, and a coffer dam thrown around below the foot of the apron.

The lock had now become undermined from end to end. The berme wall at the head was settling more, and the towpath wall breaking above the upper gates. The earth was again dug out, except the old concrete, and the whole concreted and puddled. The floor was taken up the entire length, and two new courses of white pine seasoned plank spiked down, and farther secured by hard wood cross timbers, 5 by 8, at every 3 feet, bolted through and through the foundation, at every 2 feet, with $\frac{3}{4}$ inch square bolts, together with an inch toebolt into the side walls at each end.

This floor is intended to be ample to hold the head water should it get on again by breaking under. But with the lock undermined, the chances are that another breach would send it through to the river below, and utterly destroy it.

The berme wall settled still more at the last break, and is now down eleven inches at the head. The tow-path wall broke in two, zig-gag, from top to bottom in the recess above the upper gate. In going down the walls have lopped over, making it necessary to trim both upper gates, and cut an inch and a half off the masonry, both sides, above. Since the completion the walls yielded some, and gave trouble to some wide boats in passing. They have now been trimmed again.

This lock was originally built by the superintendent of repairs, commenced the 9th of September, 1835, (see Canal Commissioners' report, made Jan. 20, 1836, page 28,) and in the absence of any other [report to refer to, I conclude finished in the season of 1836. It was overhauled in the winter and spring of 1860, the lower mitre sill lowered, the wings rebuilt, and the walls raised two and one-half feet, to correspond with the enlarged canal above.

The lock stands on the best specimen of quicksand in this region, and not upon piles. There was a solid row of piles driven around the pit to keep the quicksand back at the time of building it in 1836, and the lock put down inside. These piles

were found standing from two to four feet above the floor when excavating at the head to repair the breaks, and very much facilitated the passage of the water down and under the floor after reaching them.

The question now is that of re-construction. That it will not do to depend upon the old lock at all, even if it stands the season out, is apparent. That the procuring of material for a new lock in either location should be immediately entered upon and pushed forward with rapidity, is equally apparent. That the new lock should be put upon piles is still more apparent.

I cannot close this report without calling your attention to the want of a waste weir on the Liverpool level, in the vicinity of Mud lock,—one with gates to draw from the bottom. Very great delay was had at both breaks in drawing the level through a gap in the bank, of course under no head. It took from twelve to fifteen hours, and meanwhile but very little could be done towards forwarding the repairs.

Respectfully submitted,

M. S. KIMBALL, *Resident Engineer.*

As to the cause of these breaks engineers and others fully acquainted with the lock agree that it was first damaged two years ago, when the lower mitre sill was put down and the wings re-built. During the entire winter the lock had to be kept empty in order to prosecute the work, and during the whole time the quicksand (which is the foundation of the lock itself,) boiled up through every seam and joint of the floor. No danger was apprehended at the time; but that the lock was then undermined by the displacement of the quicksand, thus leaving a cavity through which the water forced its way, resulting in the breaks, there is no question. The damage to the lock having been caused by the work mentioned, and the work having been done under the direction of the State, and done subsequent to the time when the repair contract on the section commenced, thereby creating an extra risk or hazard not contemplated or provided for in the repair contract, it is evident that the State and not the contractor should pay the cost of such repairs, as in the case of the weigh-lock culvert at Syracuse. The Commissioner fully agrees with the Auditor in his opinions, as expressed in the following letter:

STATE OF NEW YORK:

CANAL DEPARTMENT, ALBANY, }
December, 21, 1861. }

HON. B. F. BRUCE, *Canal Commissioner, Syracuse:*

Dear Sir—I have a letter from Messrs. Van Vleck and Kimball, division and resident engineers on your division, stating the condition of Mud lock, or lock No. 5, Oswego canal, before and after its enlargement in 1859–60, and concluding with the expression of the opinion that the risks of the repair contractor had been increased by the act of the State after the contract for repairs had been executed. Under these circumstances I am of the opinion that the expense of the recent repairs of the lock should be paid for by the State, and not the contractor. The principle involved in this case is the same as that applied to the repair of the weighlock culvert on section 8, Erie canal, at Syracuse. I cannot see any distinction between the two cases, and am satisfied the legal liability of the State is the same in both.

Respectfully, yours,

N. S. BENTON, *Auditor.*

Believing the position thus taken to be fully fortified by the attendant circumstances, the Commissioner has drawn his draft on the Auditor of the Canal Department, in favor of the contractor, for \$4,755.43, cost of the repairs.

The waste weirs at Haskin's mill on the Salina level, and on section No. 3 (Liverpool level), were raised to seven feet above canal bottom; and subsequently lowered three inches, in accordance with a resolution of the Canal Board. Total cost, \$1,100.

On the 2d day of July, the Canal Board authorized an improvement of the outlet of Bloody brook culvert, at Liverpool, and appropriated therefor \$600. The work is not completed, nor can it be for the amount provided. An additional appropriation of \$360 is recommended.

The Baldwinsville dam has been thoroughly overhauled, and is still in course of reconstruction. Considerable remains to be done to render the dam permanent, but owing to high water little more can be accomplished this season. The cost thus far is about \$2,000.

The sluice authorized by the Canal Board last year, to conduct water around the upper lock to supply the north side-cut, at

Salina, has been completed by the contractor. It fully answers the purpose for which it was designed. Cost \$1,575.28.

Previous to the opening of the canal the level between Syracuse and Salina was thoroughly bottomed out. The waste weirs having been raised, and to prepare this level for seven feet of water, it became necessary to raise the docking on the berme side through Liverpool, which was done. The total expense on the level is \$8,256.62.

Towards the close of the season a boat laden with corn sunk in the river level near New Bridge. An examination was immediately made by Engineer Kimball, which revealed the presence, in the channel, of a bar of cemented sand and gravel, about forty feet in length, with a base about five feet in width, and rising in the centre to a point three feet above canal bottom, sloping from the summit to the base on either side. A dredge was worked diligently upon it for several days, but owing to the extreme hardness of the material it could not be removed, and the dredge was withdrawn after an expenditure of \$240. Possibly it may be blasted, but the depth of water will render it difficult. Its removal will be expensive but indispensable.

Nothing has been done during the season to the lock at the foot of the Baldwinsville canal. It was found in such a dilapidated condition, and believed to require such extensive repairs, that it was deemed best and prudent to await the decision of the Legislature, this winter, before whom, it was understood, a bill would be brought authorizing the construction of a new lock, on a new site further down, and sinking it deeper, to correspond with the height of water as changed by the improvement at Gascon. In view of this, and to avoid an expenditure which might be lost, nothing has been done beyond what was required to keep it in working condition. Should the Legislature fail to authorize the construction of a new lock, the old one must of necessity be overhauled before the opening of the canal next season.

The Phoenix dam had settled to such an extent that it was with difficulty that flush-boards were put on and afterwards kept on, to sustain a depth of water required for navigation. It has been raised to a point seven feet above canal bottom and otherwise repaired, at a cost of \$1,019.95. All the dams on the river are very old, and require almost constant repairs. The question of re-building, or otherwise making them more permanent, must soon be met.

REPAIR SECTION No. 2.

STINSON OSTRANDER, *Contractor.*ROBT S. KELSEY, *Sup't.*

This section extends from Three River Point to Oswego, including the Oneida river improvement,—43 miles. Contract price per annum \$12,899. Contract expires January 31, 1862.

The structures are

- 13 stone lift locks,
- 5 stone guard-locks,
- 2 steamboat lift stone locks, 120x30,
- 5 wooden waste weirs,
- 7 wooden road bridges.
- 2 wooden road and change bridges,
- 6 wooden change bridges,
- 1 wooden river tow-path and change bridge,
- 2 iron road bridges,
- 2 stone river dams,
- 7 wooden river dams,
- 1 aqueduct,
- 1 bulkhead,
- 1 draw bridge,
- 4 composite culverts,
- 20 lock houses,
- 1 State shop.

No breaks have occurred on this section. There have been no delays, except for a few hours, in consequence of the falling of a lock gate at the time "Mud lock" was disabled, and the raising of lock gates to supply new bolts to paddles. When the increased draught of boats was authorized, it became necessary to excavate the remains of two old coffer dams near Oswego, upon which boats touched. They were dredged out at an expense of \$567.50. An opening has been made in the coffer dam running up the river above Phoenix, to allow boats, as formerly, to cross the river to load. Cost \$300.

Five substantial cribs have been put in at Horse-shoe dam to secure boats, in times of high water, from being carried over. The Canal Board added this work to the construction contract.

There are other dams requiring similar cribs for the protection of boats, among which is the one at Big Mill, four miles above Oswego, and which is the most dangerous, and demands early attention the coming season.

The dam at Braddock's rapids, three miles below Fulton, which had been gradually raised by former superintendents of repairs till land owners adjoining the river above it had made complaints and applied for damages, has been lowered to seven feet above canal bottom. Cost \$747.73.

The Oswego Falls bridge over the canal, of eighty feet span, had commenced to fail because of the insufficient height of trusses. New trusses have been added, at a cost of \$254.99.

ONEIDA LAKE CANAL.

WM. R. CHAPMAN, *Contractor*. ARCHIBL HESS, *Superintendent*.

Contract price per annum, \$2,375. Contract expires September 30, 1865.

The structures are :

7 wooden lift locks.

2 culverts.

1 towing-path bridge.

2 road bridges.

3 lock houses.

4 watch houses.

1 collector's office.

This canal connects the Erie canal with the waters of Oneida lake, furnishing thirty miles of lake navigation, intersecting the Oneida River improvement, which forms a junction with the Oswego canal at Three-river Point. The Oneida Lake canal, proper, is six miles in length, and extends from the Erie at Higginsville, to the head of Oneida lake. Its navigation has been subject to much delay and damage, in consequence of sand bars at the mouth of Fish creek. These bars have long been a source of great difficulty. They are constantly changing their position during each season, but never fail to so obstruct the channel as to prevent the passage of loaded boats. The only preventive against this evil is the construction of a suitable pier, to extend some distance into the lake. The subject was brought before the Canal Board last year, but for want of jurisdiction was dismissed, on the grounds that the "blue line" of appropriation did not extend to where the pier should be constructed. A plan and estimate for a pier was made by resident engineer Kimball, and submitted to the Canal Board. Total cost \$8,000. The Com-

missioner earnestly commends the subject to the attention of the Legislature.

All the locks (seven in number) on this canal have been going from bad to worse, until they have reached a point when their dilapidated condition involves the necessity of rebuilding them entire, or else abandoning the navigation of the canal.

A law for their rebuilding passed the Legislature at the last session, but failed to receive the approval of the Governor.

This canal furnishes access to a large extent of country, rich in manufacturing and agricultural resources. The State having constructed and maintained it for many years, and agriculturists and manufacturers having located themselves and established their business in reference to the facilities the State thus promised to afford, it would seem that they have a *right* to ask, either that the State put the canal in good condition, or boldly and unqualifiedly abandon the work it has constructed. In either case the people interested, fully understanding the policy of the State in reference to it, might be essentially benefited.

CAYUGA AND SENECA CANAL.

W. H. H. GERE, *Resident Engineer.*

JOHN ECKER, *Contractor.* ARCHIBL HESS, *Superintendent.*

This canal extends from the Erie at Montezuma, to Seneca lake at Geneva, with a branch from lock No. 9 to East Cayuga, at the foot of Cayuga lake. Total miles in length, 23. Contract expires four years from June 1, 1861. Price per annum \$4,490.

The structures are :

- 11 composite lift locks.
- 1 side lock at Seneca Falls.
- 9 culverts.
- 1 pier at foot of Cayuga lake.
- 1 pier at foot of Seneca lake.
- 7 iron bridges.
- 15 wood bridges.
- 5 dams.

There has been no detention to navigation during the season, except the delay in opening. On the first day of March about one hundred and fifty lineal feet of the stone retaining wall at Seneca Falls gave way, in consequence of an imperfect foundation. The breach in the wall allowed the water in the river to flow off so rapidly that another breach was made in the towing-

path bank at the head of lock No. 6, of about sixty feet in length.

At this time Moses E. Ludington was the contractor for repairs. By the terms of the contract it was his duty to repair the breach in the wall, and to that effect notices and directions were given him; but on the 15th day of March he voluntarily abandoned his contract.

The rebuilding of the dam was placed under contract on the 18th day of March, and the work was prosecuted with the utmost vigilance and despatch, until the 11th day of May, when the work was completed and the canal made navigable throughout.

From the date of the abandonment of contractor Ludington till the first of June (when the canal was again placed under contract), the repairs were under the charge of the superintendent. By him the canal was prepared for navigation, and the following structures built :

One road bridge, wood, on section No. 11, at Waterloo. Cost, including the piers and abutments, \$1,741.51.

A towing-path bridge across the "Soap Mine," on section No. 13, Geneva level. Cost \$1,522.09.

The retaining wall at Virginia-street bridge, in the village of Waterloo, gave way in the early part of the season, and has since been rebuilt by the repair contractor on a more durable plan. The foundation of the old wall was defective, and the wall was too light for the height of bank which it was required to sustain. These defects have been remedied in the new wall, which was laid in hydraulic cement.

The locks were all repaired last spring by the superintendent. The north side of lock No. 3, at Seneca Falls, was concreted between the dry walls in the chamber and the timber lining, to prevent leakage through the side walls, which, at this lock, had become a matter of serious difficulty. The plan was found to have effectually removed the difficulty, and it is recommended as the best means of preventing the leaks at most of the locks upon this canal.

There was a large amount of material removed from sections Nos. 5, 9 and 10, previous to the opening of navigation. The enlargement contracts for these sections had been settled for from one to five years, and a large portion of this material had without doubt never been removed. Navigation for boats drawing five and one-half feet of water could not have been sustained

had this work not been done. It was under the special charge of the superintendent, who reports the cost at \$4,505.14.

The division wall at Seneca Falls, below lock No. 3, has been raised and pointed, pursuant to a resolution of the Canal Board, at a cost of \$999.68.

ENLARGEMENT OF THE CAYUGA AND SENECA CANAL.

Sections Nos. 1, 2, 3, 5, 9 and 10, and all of the structures except waste gates on section No. 9, dam at Waterloo, and extension of retaining wall on section No. 10, are fully completed.

The remaining sections are so nearly completed that there will be no difficulty in finishing them before the opening of navigation next spring,—provided there are funds appropriated for that purpose.

The guard gate on section No. 9, at Seneca Falls, is under contract.

The building of the Waterloo dam was placed under contract on the 5th day of September, 1855, under which contract there has been nothing done. This dam was proposed for the purpose of controlling the waters from Seneca Lake, and it seems important that these waters should be governed by the agents of the State. No little inconvenience has been experienced during the past season in consequence of the mill owners near the old dam placing flush-boards upon the dam to raise the water in the river above. These boards, by the direction of the undersigned, have been repeatedly removed, and again immediately put on by the mill owners.

Section No. 13 cannot be completed on the plan now adopted unless the surface of Seneca Lake is allowed to lower to its low-water mark.

The extension of the retaining wall on section No. 10 is under contract, and a portion of the materials for the work delivered.

The estimated cost of completing the enlargement of this canal is as follows :

Sections Nos. 4, 6, 7, 8, 11, 12 and 13 (now under contract)	\$14,762 64
Retaining wall on section No. 10.....	3,096 50
Waterloo dam.....	2,388 50
Guard-gate on section No. 9.....	2,414 00
Total	<hr/> \$22,661 64

ITHACA INLET.

Provision should be made for the repairs of the Ithaca inlet. It is not embraced in any repair contract, though it was purchased and is now owned by the State. The long pier (built by the State,) is very much dilapidated and needs speedy and extensive repairs to save it from utter ruin. The channel should be dredged out, and a new bridge erected. The total cost would be about \$3,500.

CROOKED LAKE CANAL.

W. H. H. GERE, *Resident Engineer.*

HOMER W. RANDALL, *Contractor*, by FARLEY HOLMES, *Assignee.*

OLIVER ALLEN, *Superintendent.*

This canal extends from Crooked lake, near Penn Yan, to Seneca lake, at Dresden,—distance 8 miles. Contract price per annum \$3,869; expires five years from October 1, 1860.

The contractor upon this canal last spring bottomed out the prism for nearly its entire length. The locks were in very bad condition, and have been extensively repaired.

The bridge at Penn Yan and high retaining wall adjoining, have been rebuilt in a substantial manner; the wall of solid stone masonry laid in hydraulic cement, and of a thickness corresponding with the height. Cost of the work \$1,933.40. This work was ordered by the former Commissioner.

The old stringer bridges upon this canal are believed to be unsafe, and should be re-built upon an improved plan as soon as possible.

Nothing has been done to the towing path on the upper level. About 1200 yards of this towing path should be raised and a rip-rap wall made on the face of the bank. A break occurred on the Dresden level on the 29th of September, which detained navigation three days. With this exception navigation has been uninterrupted throughout the season.

CHEMUNG CANAL AND FEEDER.

W. H. H. GERE, *Resident Engineer.*

THOMAS W. ARMSBURY, *Contractor*, by JARVIS LORD, *Assignee.*

OLIVER ALLEN, *Superintendent.*

This canal extends from the head of Seneca lake, at Watkins, to Elmira, including the feeder from Horseheads to Knoxville,

making a total distance of 39 miles of navigable canal. Contract price per annum, \$13,475; expires January 31, 1862.

The structures are:

- 2 composite locks,
- 13 timber locks,
- 1 timber guard-lock,
- 38 old timber locks,
- 4 aqueducts,
- 13 waste weirs,
- 2 culverts,
- 1 dam and bulkhead,
- 3 road bridges, iron,
- 35 road bridges, wood.
- 14 farm bridges,
- 1 towing-path bridge, wood.

New structure:

- 1 towing-path bridge across Chemung river.

Navigation during the season has been good, only one break having occurred to interrupt the passage of boats.

On the 20th day of October, the water in the Chemung river at Corning, rose to the height of about 14 feet above ordinary low water, filling the canal at the foot of guard-lock for about 500 feet in length, with gravel, and causing at the same time a breach about two miles from the guard-lock, in the towing-path bank, nearly 800 feet of which went out to a depth of some ten feet below canal bottom. Several smaller breaks occurred at the same time on the feeder. The breach was repaired by the contractor as speedily as possible, but a second flood came while the level was being filled which rendered it necessary to again draw the water to clear out a new bar formed at the foot of guard-lock. The whole detention to navigation was eleven days.

The docking near Corning, was badly damaged by this freshet, and was repaired upon an improved plan, at a cost of \$2,886.10. The same flood carried away the rear of guard-bank at the dam and towing-path below guard-lock, which has been repaired and protected with rip-rap wall. Cost \$503.67.

The towing-path bridge over Chemung river at Corning, has been completed, at a total cost of \$16,283.70. It is a matter of doubt in the minds of many, whether this bridge will stand during the freshets of water and ice to which it is exposed. There is danger that the water will undermine the piers, though they

have been protected with stone and brush in the most perfect manner. The channel of the river at the bridge, is somewhat contracted, which produces an unnatural current that can only be obviated by adding another span, and perhaps two, to the structure.

A waste weir has been constructed at Gibson, to govern the water in times of excessive floods. Cost, \$1,181.74.

An iron bridge has been constructed in Church street in the village of Elmira. The difference in cost as between building of wood on the old plan and of iron as constructed, is \$1,104.21, which amount was paid by the State.

The prism of the canal was well bottomed out last spring, as directed.

There are thirty-six old wood locks on this canal, which have been in use more than twenty years. They were as well repaired last spring as their decayed condition would admit of, and have been used through the season with little interruption. Ten of them are now under contract to be rebuilt this winter, and a large quantity of materials for the purpose has been delivered.

The remaining twenty-six locks cannot be rebuilt too soon, as they are so badly decayed that it is impossible to anticipate the time when any one of them may fail, but which time, at the farthest, is not far in the future.

The bridges upon this canal have been repaired during the season, and it is believed that all except one, between Big Flats and Gibson, are in a safe condition. The one excepted should be rebuilt, with stone abutments substituted in place of the present wooden bents.

The culvert at Breed's creek, near Big Flats, which was too small to carry off the water in time of floods, has been enlarged and improved, at a cost of \$1,291.66.

The channel of Chemung river, at Corning, has been cleaned out, to enable boats to load at the docks. Cost \$1,023.88.

The berme bank on the Elmira level has been raised and improved, to prevent the water from the canal flowing over the adjacent lands. Cost \$456.30.

Two bridges across Mill creek, at Havana, have been repaired, at an expense of \$557.71.

The pier at Watkins, at the head of Seneca lake, which has been very much out of repair for some years, has been repaired and raised to a proper height. The harbor has become so filled

with sand by the wash of the lake, that it is with great difficulty that steamboats can make up their tows in times of high winds. It is recommended that the harbor be cleaned out, and further piers constructed to prevent further trouble.

The bridge spanning the old abandoned canal at Watkins, which was destroyed by a freshet about a year ago, has been rebuilt. Cost \$350.

Mill-creek bank, near the village of Watkins, is an important work, for the protection of the lake or lower level. This bank has several times been washed away, allowing the waters of the creek to flow into the canal in times of floods, filling the prism with gravel. A protection has been put in to prevent further trouble from this cause, costing \$291.83. A further extension of this work seems indispensable.

On the 29th of September last a freshet occurred in the Chemung river at Corning, which caused great damage both to the works of the State and to lumber and coal yards of individual companies. The water arose to the same height as the June freshet of 1857, when the whole canal was nearly washed away; fortunately the dam and guard-lock stood, though not without being badly damaged. The docking at the head of the guard-lock was washed out for nearly one hundred feet in length. The pier between the raft-shute and dam was undermined and the filling taken out for some four hundred feet, leaving the crib standing without support, and leaning badly towards the river. An independent crib will have to be sunk outside the old pier, properly tied and filled with stone, to retain the work in its present position.

The docking on the east side of the river, between new and old change bridges, was badly injured by water running over it. The river, as will be seen by reference to the map herewith attached, is confined between a high bank on one side and docking at the other. At the new change bridge the channel is somewhat contracted by new guard or towing-path bank, and the piers to bridge and ice breakers above occupy about 40 feet of the channel as provided at that point. In time of excessive floods the river raises above the docking and guard banks, and the surplus waters flow over the low lands adjoining, thereby destroying the docking and carrying off any lumber and coal that may be deposited on the banks awaiting shipment. This freshet

destroyed the guard bank built by the Tioga improvement company and Fall Brook coal company, for the protection of their coal yards, and carried off large quantities of coal. Their trestle work was badly damaged, and the yards covered with flood wood. The lumber yards below had no protection, and, if possible, fared still worse than those of the coal companies.

It is important that something be done soon to confine the river within its natural channel, else it will make for itself a new one, at the point marked on the map as "washed out," as the freshets of the last two years have prepared the way for the workings of future floods. Should the course of the river be changed as it is naturally inclined, the new change bridge would be rendered worthless, without an extensive addition to its length. It would seem advisable, however, to allow the point at the elbow to be washed away in order to give the water a more natural flow.

It is thought indispensable by parties interested in the commerce of the Chemung canal that something be done at this place to protect property awaiting shipment. There are various plans suggested to effect this object. One is to raise the present docking from the old change bridge to the point on map marked A, six feet higher than at present, with sloping bank in rear, and from the end of dock thus built to construct an entire new guard bank to new change bridge, so as to leave the channel of river eighty feet wider than at present, and extend the bridge another span of eighty feet. The work upon the above plan is estimated to cost \$18,000.

The height of dock, if built upon this plan, must prove a great inconvenience to shipping lumber and coal from the yards in the rear; but would fully answer the purpose of protection from water.

Another plan is to excavate a new channel or slip across the flat from new change bridge, taking the material excavated to make a guard bank along and in rear of old dock. This would very much enlarge the shipping ground, and be entirely secure against floods.

The map annexed shows the location of the proposed new slip, &c. The cost upon this plan, exclusive of land damages, is estimated at \$13,000.

The great importance of this subject is earnestly commended to the attention of the Legislature.

CHENANGO CANAL.

W. H. H. GERE, *Resident Engineer.*EDWARD E. WELTON, *Superintendent.*

This canal extends from the Erie canal at Utica, to the Susquehanna river at Binghamton, 97 miles.

It comprises three repair sections, as follows :

SECTION No 1.

ALONZO PECK & Co., *Contractors.*

Contract expires five years from May 1, 1861. Contract price per annum, \$13,990.

Section extends from the junction of the Chenango and Erie canals, in the city of Utica, to the foot of lock No. 81, one mile south of the village of Hamilton, 31 miles. The following reservoirs are located upon this section : Madison brook, Woodman's pond, Leland's pond, Bradley's brook, Hatch's lake, and Eaton's brook, all of which are in the southern part of Madison county. Connected with the section are $13\frac{3}{4}$ miles of feeders. Total miles, canal and feeders, $44\frac{3}{4}$ miles.

The structures are :

- 77 composite lift locks.
- 4 stone lift locks.
- 4 wooden trunk aqueducts.
- 1 stone arch culvert.
- 1 guard-lock.
- 12 arch culverts.
- 7 box culverts.
- 9 waste weirs.
- 3 iron bridges.
- 44 wood bridges.
- 30 bridges on feeders.

SECTION No. 2.

JOHN P. SMITH, *Contractor.*

Contract expires five years from October 1, 1860. Contract price per annum, \$5,600.

Section extends from the foot of lock No. 81 to and including first farm bridge above lock No. 100 : distance, 34 miles.

The structures are :

- 18 composite lift locks.
- 8 wooden trunk aqueducts.
- 6 waste weirs.

- 9 bridges on feeders.
- 3 iron bridges.
- 60 wooden bridges.
- 13 arch culverts.

There are six feeders with an aggregate length of four miles, with dams to the length of 1,000 feet.

SECTION No. 3.

JOSIAH BRINTNALL, *Contractor*, by SNOOK & BEEBE, *Assignees*.

Contract expires five years from May 1, 1861. Contract price per annum, \$7,000.

Section extends from the first bridge north of lock No. 100 to the junction of the canal with the Chenango and Susquehanna rivers, in the village of Binghamton: distance, 32 miles. The Stratton and Chenango Forks feeders are located on this section, the Stratton, being about fifty rods in length with a dam three hundred and fifty feet in length, and having two bridges, one farm, the other towing-path. The Chenango Forks feeder consists of a dam three hundred and fifty feet in length, with a guard-lock, having a towing-path bridge across it.

The structures are:

- 1 stone lift lock.
- 14 composite lift locks.
- 1 guard-lock.
- 2 dams.
- 7 waste weirs.
- 5 wooden trunk aqueducts.
- 3 iron bridges.
- 55 wooden bridges.
- 10 arch culverts.
- 1 bridge on feeder.

The supply of water for this canal is from the reservoirs and Chenango river.

The work done on this canal during the season is as follows:

A new waste weir has been constructed on the North Norwich level, at a cost of \$452.46.

The aqueduct across the Chenango river, near Sherburne, which was reported by my predecessor as in bad condition, was placed under contract on the 19th day of February. The south abutment was rebuilt before the opening of navigation, and the remaining portion of the structure protected and secured in such

a manner as to answer the purpose of navigation during the past season. During the summer the materials for the remainder of the work were prepared and delivered. The completion of the work before the opening of navigation next spring may be confidently relied upon.

Two iron bridges have been constructed by the repair contractor, the State paying the difference in cost of rebuilding, of wood on old plan, and of iron on new plan, as provided in the repair contracts. One of these bridges was built in Court street, in the city of Utica, at a cost to the State of \$1,238.80; and the other at Norwich, costing the State \$1,209.09.

The re-building of lock No. 89, on section No. 2, was placed under contract, on the 5th day of September, which will be fully completed by the opening of navigation next spring.

The locks upon this canal are in a very bad condition, and will constantly require a large outlay to keep them in fair working order. They are of a composite construction; the wings at head and foot were built of rubble masonry; to a depth of one foot from the face the stone were laid in cement, and the balance of the walls laid dry. The chamber walls are of stone, laid dry, and lined on the face with timbers and plank. Several of these locks have been so affected by frost heaving the walls from the rear, that it is with difficulty that boats can be forced through. Another, and no less serious difficulty, is the leakage of water through the walls into the level below; causing not only a large waste of water, but greatly endangering navigation. Locks Nos. 82, 89, 96, 100, 103 and 104 may be referred to as some of the worst, and there can be no doubt that safety to navigation and economy in water, requires that the lower wings, at least, of such locks be laid in cement throughout.

ABANDONMENT OF CONTRACTS.

The resident engineer, in his report to the Commissioner, says: "From personal observation during the year 1860, and from information derived from other sources, it became evident that the work of keeping this canal in repair for the past few years had been greatly neglected, and to such an extent had that been the case, that it was necessary to maintain the surface of the water in the canal much higher than was contemplated in its original construction, in order to secure the required depth of four feet of water, thus largely increasing the danger from breaks, causing

the banks to leak, and of necessity the bridges had to be raised, which had been done temporarily in almost every case.

"By the terms of the repair contracts of the present time, the contractors are required to 'put and to keep in good navigable condition,' the portion of canal embraced in the contract, 'well bottomed out to its original base or bottom line,' &c.

"In order to ascertain approximately the extent of the repairs necessary on this canal before the opening of navigation last spring, a competent engineer was employed in the month of February last, who, with the Superintendent, passed over the whole canal, making such measurements as the season would admit of, and from the notes and observations thus taken, reported an estimate of the work indispensably necessary to be done.

"For the purpose of calling the attention of the contractors to the importance and magnitude of the work demanded by the terms of their contracts, I enclosed each of the contractors a copy of the estimate for their several sections,* and required each to employ a force, the amount of which was named, within one week from that date (February 16), to which order no notice was taken by the contractors on sections Nos. 1 and 3, so far as could be observed on passing over the canal on the 27th and 28th days of February, at which time there could have been no difficulty in prosecuting the work with vigor. The contractor on section No. 2 was making preparations to commence work, and gave reasonable assurance of his determination to do all required of him, which he did in the most satisfactory manner.

"Knowing the importance of the work required to be done on sections Nos. 1 and 3, and the apparent determination of the contractors to leave it undone, I, on the 2d day of March, certified to the Contracting Board that the repairs upon those sections 'are not promptly and properly made as directed,' whereupon the Contracting Board annulled the contracts for those sections."

The work of spring repairs upon sections Nos. 1 and 3, was placed under contract, and only such work done as seemed indispensable to secure good navigation. The whole amount of work done under those contracts, amounts to \$15,660.71 on section No. 1, and \$13,709.59, on section No. 3.

The work of keeping these sections in repair for the term of five years, was again placed under contract, to take effect on the

* For a copy of such notice, see Appendix C.

first day of May, since which time the contractors have exhibited a disposition to perform their work according to the terms of their contracts.

Upon section No. 1, the contractors have performed a large amount of work which had been neglected for years. All of the bridges, farm, road, and towing-path, have been thoroughly repaired and newly painted, and the towing-path under the bridges raised above water.

The trunk of Capron aqueduct, being regarded as in a dangerous condition, was strengthened for use the past season. The trunk will be entirely rebuilt during the present winter.

The structures on section No. 2, are generally in fair condition, having been better preserved than upon the other sections. Many of the bridges, however, remain as originally constructed, and are liable to fail at any time.

The contractors upon section No. 3, since assuming the work on the first day of May, have principally directed their attention to the maintenance of good navigation, and lining the face of banks to prevent leakage, which latter difficulty had become a matter of serious complaint from property owners, as well as a serious waste of water. The repair of many, and the rebuilding of five bridges, was a matter of necessity, which work was done at heavy expense to the repair contractors.

The ends of two of the piers to the aqueduct below Chenango Forks, are in a bad condition, and should be relaid this winter.

There are about four miles of the prism of section No. 3, which, owing to a want of time, was not bottomed out last spring. It is important that it be done before the opening of navigation next season. With this exception, it is not known that there is any portion of the canal that should be bottomed out except the removal of such bars as may have been formed during the past season.

The maintenance of satisfactory navigation upon this canal has become a matter of serious difficulty, if not of absolute impossibility, without keeping the depth of water above four feet. The model of most of the boats now in use, and the determination of forwarders and boatmen to overload, is the cause of the whole difficulty. The canal is but twenty-six feet wide at the bottom, and the width of boats being very nearly fifteen feet, and loaded to only three and one-half feet in depth, there is not sufficient room for fully laden boats to pass without grounding.

Some difficulty of this character was experienced last spring on section No. 3, which was remedied by increasing the depth of water.

Only one break has occurred upon this canal during the season of navigation. On filling the canal in the spring, about fifty feet of bank went out on the Binghamton level, which required about two days to repair.

A detention of three days occurred at Sherburne aqueduct in the spring, in consequence of letting in the water before the new masonry work had properly "set."

A boat laden with coal, sunk in lock No. 104, and interrupted navigation two days. The circumstances as detailed by the lock-tender to the Commissioner, were as follows: The upper level was low about six inches, and the lock, on account of its dilapidated condition, (and which can only be repaired by rebuilding the wing walls) was leaking badly. The lock-tender directed that the boat should remain until the level could be filled; but the master of it could not be prevailed upon to allow it to so remain, and on the contrary employed an extra team and attempted the removal of the boat by force. When its midship reached the ends of the walls, the water had become so low by leakage that it settled upon the breast-wall and was consequently damaged.

Some slight delays have occurred by the breaking of lock gates and raising of mitre sills. Further than above described, it is believed that navigation has been uninterrupted throughout the entire season.

The former contractor on section No. 1, Edwin W. Park, whose contract was declared abandoned by the Contracting Board, on the fifth day of March, has commenced a suit against the Commissioner for the recovery of moneys claimed by him as compensation for the months of February and March. The cause was noticed for trial at the circuit held at Rochester, in October last, but was not reached on the calendar. This is the first case that has reached the courts, where the legality of the right of the Contracting Board to abandon a repair contract for cause, is to pass a judicial investigation. The Attorney General is retained on the part of the State. Should the cause be renewed against the successor of the present Commissioner, it will become important as a *test case*, in reference to other and all repair contracts which have been abandoned.

For a statement of expenditures upon the Middle Division, see tables appended.

THE REPAIR CONTRACT SYSTEM.

The system of repairing the canals by contract is yet an experiment, and *may* prove highly advantageous to the State, when all the details are fully carried into *practical operation*, as they seem to be established in theory. There are now, however, some obstacles in the way of its complete success. During the past five years in which the system has been in general operation, the State has saved a large amount of money in expenditures upon "ordinary repairs." That it has lost much by the neglect of contractors to comply with the stipulations of their contracts, is undeniable. One difficulty arises from the length of time for which such contracts are made. This is so short that a contractor does not and cannot feel the same interest in putting and keeping his canal in a good condition permanently, that he would if his contract extended through a period of ten, twelve or fifteen years. When he enters upon the work of his section, and examines the condition of the bridges, locks, culverts and other structures (dilapidated though they may be), the first inquiry of his own mind is, "Will these structures hold together until my contract expires?" If he concludes they will not, the next inquiry is: "How can I repair them in the cheapest possible manner, to answer best my own interests?"

It is apparent that if he contemplated having these structures in charge for ten or fifteen years, good economy would dictate, and be likely to influence him, to make the repairs in a more substantial manner than he is now induced to do. His own interests would then be identical with those of the State. It does not materially change the nature of man to make him a repair contractor. Under ordinary circumstances the *less* he manages (by various expedients and shifts, economical to him but ruinous to the State,) to expend on his section the *more* he will save under his contract, his compensation, like that of a sinecure, depending upon *the time expended* rather than the *amount of labor performed*. He will be very likely to do just as any man, aiming or seeking to make money would do under like circumstances—do as little for the pay as possible.

True, his contract may be declared abandoned, if he fails to comply with its requirements, or he may himself abandon it when he finds the accumulated results of his own neglect, for a period of from three to five years, compelling him to the performance of

an amount of labor, the cost of which will not be covered by his yearly compensation.* Since the system in question has been in operation, very many repair contracts have been declared abandoned by the Contracting Board, and the bonds uniformly handed over, as the statute directs, to the proper officer for prosecution. When this has been done the cases seem rapidly to disappear from public view. It would be difficult, from a most diligent search of the records of the courts, to find an instance where a judgment has been recovered against a contractor or his bail, and the amount of the judgment collected and paid into the treasury, as the law contemplates and provides it shall be. The public would be gratified indeed to learn of a single instance where the statute in all its details, in reference to this subject, has been fully complied with. One such case, as an example, would do more to deter a reckless, improvident class of men from making extremely low bids, and securing contracts which, when enforced, are ruinous to the parties and injurious to the State, and do more to establish the repair contract system upon a firm, reliable, working basis, and to secure faithful, trusty and diligent men, as contractors, than could be effected by simply abandoning contracts by the Contracting Board, in a hundred instances.

Again, the practice of appealing to the Legislature for "relief," in cases where contracts have been abandoned, has become patent, and the clemency of the Legislature fully established.

All the canals of the State being now under contract for repairs, it is due to the State and to the system itself, that it have a thorough and impartial trial, divested of all extraneous and unnecessary difficulties. To effect this, the law and the requisitions of the contracts should be fully enforced and complied with. This imposes a heavy burden of very unpleasant duty upon a Commissioner, and especially when he sees and knows that the contract price is far below the real value of the services he requires. Still, he has no discretionary power, with the right to say that work contracted to be done, need not be performed. The Commissioner of the Middle Division has had no official duty to discharge during his term, so unpleasant and so reluctantly performed, as that of abandoning repair contracts. He is, however, happy to be able to assure the Legislature that

* Such was the case with the contractors whose contracts were abandoned on this division last spring, to which references are made in other parts of this report.

the present repair contractors on his division have, during the past season, been faithful and diligent in the full discharge of their contract duties, notwithstanding the fact that (with perhaps a single exception) they have each expended more money in repairs, under their respective contracts, than they have received as yearly compensation.

LOCKS ON THE MIDDLE DIVISION OF THE ERIE.

There are six lockages to be made by boats passing over the Middle Division of the Erie canal, five of which to *eastward* bound boats are upward lifts. These are the only ones of that character on the whole line from Buffalo to Albany.

DETENTIONS AND THE CAUSES.

Since the largest class of boats have been introduced, and particularly since their draught of water was increased to five feet and nine inches (soon to be six feet it is hoped), some delay has been experienced at the locks above mentioned, and as the evil will be increased as the number of large boats and the draught of water are augmented, the subject demands attention. The delay is consequent upon the difficulty attending the entrance of boats into the lock, which is so entirely filled as to leave little room for the requisite displacement of water at the sides of the boat, and the water is consequently driven to force its passage *under* the boat. This resistance, together with the resisting power of the current, created by the unavoidable leakage of the gates and paddles, is found to be more, and in many cases twice as much, as the ordinary motive power applied to boats can overcome. This is especially true of the locks on the berme side, at which the average time consumed in locking a boat is twenty minutes, while at the towpath lock it is ten minutes. As the delays in question are not likely to diminish, but increase, as greater draught of water is from time to time allowed to boats, it seems to be indispensably necessary to provide a more reliable and efficient power than an extra team can afford.

It is believed that a *stationary* engine of five or six horsepower, placed on the wall between the tow-path and berme locks, and used for the purpose (in addition to the power of the team belonging to the boat) of drawing boats into the lock on either side, would be found highly advantageous, by removing the cause of delay.

The cost of such power is estimated at \$600. The expense for fuel and engineer, each twenty-four hours, would not exceed \$4.50. Its trial on one of the double locks is recommended.

While speaking of delays upon the canals, the Commissioner deems it his duty to remark, that some of the detentions complained of, are chargeable in some cases to others than those having the canals in charge. While the great majority of boatmen are both willing and anxious to afford every aid within their power to disperse "jams" and "crowds," still there are some who seem disposed to pursue an opposite policy, and hinder, rather than assist the passage of boats. During the time required to disperse the crowd of boats that accumulated at the time of the failure of the weigh-lock culvert at Syracuse, it was found that during the night time, some managers of boats were more intent upon rest, than pressing forward, and it required the constant presence of officers of the canals to keep up the movement of boats during the night time, and even then the lockages were reduced far below those of a corresponding time by daylight. Provision should be made by statute, authorizing a Commissioner in case of emergency, to make temporary appointments of persons to act as a canal police, and clothe them with like powers of *regular canal officers*. When so appointed and wearing some proper insignia of office by which they would be recognized, they could render essential service in dispersing "crowds" and facilitating the passage of boats.

TEST BOATS.

Section 9, chapter 495, Laws of 1859, reads as follows: "So long as any canal in this State shall be let and under contract, to be kept in repair in pursuance of law, it shall be the duty of the Canal Commissioners to cause a boat to be laden so as to draw at least four inches more water than other boats are permitted to draw; such boat so laden, shall be run through the whole length of such canal as often as once in thirty days, day and night, and be weighed and measured at every weigh-lock, and the weight of cargo and draft of water stated on the clearance; a report of every such trip or passage shall be made to the Auditor of the Canal Department without delay, accompanied by a full copy of the clearance and the indorsements thereon, and a statement of all the delays occasioned by obstructions in the navigation or want of water, and the cause thereof. The

Auditor shall keep a full record of all such reports, and monthly publish a brief statement of the same in the State paper."

In obedience to the above statute, the Commissioner employed Mr. T. Golden Ruggles to make a trip from Buffalo to Albany. For a full detailed report of his observations, see his report made to the Auditor of the Canal Department. The cost of the trip was \$223.51. In the judgment of the Commissioner, the benefits derived are not commensurate with the expenses incurred. Such a boat, overloaded as she is required to be, is not only likely to be delayed herself, but proves a hindrance to others. The repeal of the law is recommended.

THE SYRACUSE WEIGH-LOCK.

The old scale in the Syracuse weigh-lock was twice repaired and corrected in the early part of the season, at a cost of \$184.54. The repairs, however, proved of no avail, the scale was unreliable, and was therefore rejected.

In the month of July a new scale, manufactured by Messrs. Fairbanks & Co. of New York, was erected, at a cost of \$3,500. The scale is a model of beauty and accuracy, inspiring the confidence of all who witness its operations.

The present gates in the weigh-lock are unfit, both in kind and quality, for use. They should be removed, and the improved drop-gate substituted.

OLD AND UNSETTLED ACCOUNTS.

A large number of accounts have been presented to the Commissioner for payment, some of which are from four to ten years standing. Many of them are for damages from the temporary occupation of land, some for damages from the flooding of lands, and others for gravel and material taken by the State while the canal was being enlarged. The Commissioner has found it impossible to so investigate all the claims as to satisfy himself of their validity, and thereby justify their payment. He has refused payment in every instance when the proof of indebtedness was not clear and unquestionable.

He is not aware of a single case where damages can be justly claimed for "temporary occupation," or for gravel and material taken for canal purposes during his term; that is not settled and paid.

LOCKAGES AT THE SYRACUSE LOCK (No. 49.)

The total number of lockages at the Syracuse lock during 232 days of navigation in the season of 1860 was 32,862, or an average of $141\frac{1}{2}$ per day.

The total number in the season of 1861, for 224 days, was 31,460, or an average of $140\frac{1}{2}$ per day.

Excess of total lockages in the year 1860 over the present year is 1,402, while the gross tonnage of the canals has been somewhat increased over that of 1860.

This is the first lock east of the junction of the Oswego with the Erie canal, and passes all the boats received westerly, from the enlarged Erie, Cayuga and Seneca and Oswego canals, and the smaller lateral canals—Crooked lake, Chemung and Genesee valley—which are bound eastward from Syracuse.

The large decrease in the number of lockages the past season, and the increase of tonnage upon the canals, is evidential of the fact that the capacity of boats for carrying freights has increased in a ratio quite equal, if not greater, than the amount of trade upon the canals.

It may be safely assumed that of all the boats doing the freighting business, at least one-third are of the smaller class, whose capacity will fall short an average of one hundred tons each, of the maximum load carried by the largest class of boats.

If the present large tonnage upon the canals be retained, it is more than probable that within the next two or three years, these smaller crafts will be supplanted by those of larger dimensions, carrying from one hundred to one hundred and twenty-five tons, more load. This will very much increase the facilities for doing the carrying trade.

The total tonnage of the canal for 1860 was 4,650,214 tons, of which, was carried by the smaller class of boats, about 930,000 tons; and by the larger class of boats, about 3,720,200 tons. If the smaller class of boats had been replaced by an equal number of the larger class used during that year, the freighting capacity or tonnage would have been increased about 930,000 tons, with the same movements of boats.

When these smaller class of boats are thus supplanted by the larger class, and when the full benefits of the enlarged prism of canal, and the increased depth or draught of water are obtained, the capacity of the largest class of boats will be increased.

about twenty percent. above their capacity in the season of 1860, and this would afford a further increase of business facilities to the carrying trade over those of 1860 (with the same total movement of boats) of 1,116,000 tons, making a total increase over actual amounts of 1860 of 2,046,000 tons.

The total capacity or maximum of business upon the canals (as practically limited by the number of lockages which may be made under ordinary circumstances) would largely exceed the total movement of boats in 1860, and with the increased ability of the boats as above shown, would probably be equal to a total tonnage of seven or eight million tons.

In this connection, the Commissioner would respectfully suggest that all projects for material changes in the present plan of the work, designed to enlarge the facilities of the carrying trade in anticipation of future wants, and involving large expenditures of money, should be tested by a careful consideration of these important and pertinent facts.

Among these projects, that of lengthening the locks is now most prominent; and the Commissioner, in view of the facilities for the carrying trade now existing, and the capacity for *largely increasing* the tonnage over the present wants without further expenditures, would respectfully suggest that the State may safely elongate the *time*, before elongating the *locks*.

REMARKS.

The canals of the State are now not only vindicating themselves, but exciting the admiration of the people of other States and other countries. The day has gone by when opposition to the enlightened canal policy of our Commonwealth can be again successfully established. The revenues derived from the canals during the past and present years, will effectually silence the clamor that was raised against them, when, from the mistaken policy of "reduction of tolls," the revenues were so reduced as not only to create serious alarm among the friends of the canals, but encourage their enemies in the hope that the day was not far distant when the constitutional prohibition of their abandonment and sale by the State would be removed.

The eminent wisdom of a liberal canal policy by the State, is triumphantly demonstrated by the facts revealed in the reports of the present year. The canals have not only yielded a revenue to the State of near four million dollars, but have given constant employment to thousands of her citizens with a most liberal compensation. By far the greater portion of this sum has been paid by people of other States, simply for the use of our great water highway, and not from any draft upon the productive resources of the State.

The enlarged Erie canal, by its position and capacity; by the wise policy which has placed it beyond competition as a channel of cheap transit; now invites with a most potential power, the great and rapidly increasing commerce of the Western world. From the mere cut, as it was originally constructed, it has become in less than half a century, the best, the most magnificent and most successful artificial watercourse on the continent. The far-sighted genius of Clinton—the hopeful labors of his successors—enormous expenditures, and triumph over many discouragements, have all been necessary to bring the auspicious results of the present. At last the great enterprise stands forth, itself an emphatic answer to the cavils of active opposition and the fears of lukewarm faith in its final success. This great artery of inland commerce, begins to feel the full flow of commercial vitality, and the gigantic resources of the country “neither slumber nor sleep.”

If within the short period of forty years our canals have become what they are, producing such a revenue, becoming the capacious channel of such a vast inland commerce, and all this while the unbounded resources of the west have but just begun to be understood, what may we not expect them to become during the next half century, when all the contemplated improvements shall have been completed; when the firm basis of the canal policy shall have been made firmer by time and experience, and when the wealth of the west shall have been increased a hundred fold by multiplied industry? If the west now needs our canals so much and pays so liberally for their use, what revenue will she not pay us when her vast resources shall have been fully developed? A judicious use of our present advantages, together with a generous regard of the needs of our sister States, are necessary and requisite for the mutual prosperity of all.

With the great enterprise completed—with a system settled

and perfected by experience—with the past teaching what to avoid and what to adopt—with a present full of success and encouragement, and a future filled with sanguine promises, and with a country ever increasing in commercial power and demanding increased facilities for the transmission of its commerce, it is made incumbent on those to whom hereafter the keeping of these great works shall be entrusted, to give the largest efficiency and remuneration with the least extravagance of expenditures and recklessness of management.

B. F. BRUCE.

APPENDIX.

DOCUMENTS ACCOMPANYING THE ANNUAL REPORT OF THE CANAL COMMISSIONER OF THE MIDDLE DIVISION, NEW YORK STATE CANALS, FOR 1861.

A.

RESIDENT ENGINEER'S OFFICE, }
SYRACUSE, *January 28, 1861.* }

Repair Contractors, sections 7, 8 and 9:

Last fall, previous to the close of navigation, I caused minutes to be taken of the necessary bottoming out to be done to bring the canal to the original bottom, and of the banks to be raised to bring them to the original height on your section. For your convenience and information I give you a copy of those minutes as follows:—(Quantities in lengthy detail not now given.)

On the 20th of December last I furnished Mr. Jaycox with a copy of the above condensed and carried out, at prices which I regarded as representing the actual cost of doing the work, in order to show more conclusively the amount of work to be done. On the 21st of the present month (January) I furnished the new Commissioner, Mr. Bruce, with a like copy, and for the same purpose. Thinking it may be of some benefit to you to see those estimates, I give them to you as follows:—(Estimate in detail not now given. The footing was \$10,750 on section 7, \$9,493.50 on section 8 and \$19,540 on section 9.)

The above estimates have reference particularly to the bottoming out to original bottom, and raising banks to the original height, nothing being provided in them for any other work you may have to do, leaving you to take care of that more at your

leisure. This bottoming out and raising banks is the first work to be done to provide for the full depth of seven feet water that is to be put on next spring. You can see the absolute necessity of commencing this work at once, and may regard this letter as a direction to do so. I will hold myself in readiness to go with you at any time to any point upon your work, to examine things with reference to it, you may wish. You can commence at some point where there is the largest accumulation of bottoming out to be done, where it will be the least expensive to remove the ice, and when done there, the great trouble from ice may be passed. Please indicate when and where you propose to commence first, and I will have stakes set for a guide, to the proper understanding of it.

Truly yours,

M. S. KIMBALL,

Resident Engineer.

STATE OF NEW YORK: }
CANAL COMMISSIONERS' OFFICE, }
SYRACUSE, February 2, 1861. }

To Repair Contractors, sections 7, 8 and 9:

The foregoing statement and directions, made to you by the resident engineer, have my approval, and you are hereby expressly directed to carry them out accordingly.

Yours, &c.,

B. F. BRUCE,

Canal Commissioner.

B.

SYRACUSE, February 19, 1861.

To Repair Contractors, sections 7, 8 and 9:

In the letter of the resident engineer to you of January 28, and which had my concurrence attached under date of February 2, you were directed to commence the work of bottoming out on your sections at once, and was advised how to proceed, and requested to notify the engineer so he could assist you by giving the proper levels, &c. Up to this time nothing has been heard from you, either by myself or the engineer, and neither by the superintendent in charge. You are therefore hereby directed to

commence the work in question immediately, or at farthest by Monday next, the 25th (the time was subsequently extended to Friday the 28th), and put on such a force as shall be deemed sufficient by the engineer and superintendent in charge to fully ensure the completion of the work ready for the opening this spring. In default of this the State will at once assume the work as provided by the contract.

Very truly yours,

B. F. BRUCE,
Canal Commissioner.

STATE OF NEW YORK:

RESIDENT ENGINEER'S OFFICE,
SYRACUSE, *February 16, 1861.* }

EDWIN W. PARK, *Contractor, Repair Section No. 1, Chenango canal.*

SIR—Herewith I send you an approximate estimate of the work which you will be required to do on your section before the opening of navigation next spring.

In order to do this work, it will require at least 100 men on the excavation, and a large force on the locks and other structures. The road-bridge at Bouckville is considered dangerous, and you are directed to rebuild it, a plan for which I will furnish.

You will be expected and are hereby directed, to put on at least the force above named within one week, and keep them employed until the section is put in the condition required in the communication of B. F. Bruce, Canal Commissioner, dated January 29th, 1861.

I have directed O. H. Bogardus, assistant engineer, to lay out the work for you, and you will be governed by his discretion in the prosecution of the work.

Yours, &c.,

W. H. H. GERE, *Resident Engineer.*

Approximate estimate of repairs required on section No. 1, Chenango canal. EDWIN W. PARK, Contractor.

Quantities.	Items.
20,000 cubic yards	excavation, bottoming canal.
12,000 cubic yards	graveling.
50 cubic yards	masonry.
145,000 feet board measure,	pine and oak.
2,000 feet board measure,	hemlock.
4,000 pounds	wrought iron.
1,000 pounds	spike and nails.
1 road-bridge	at Bouckville.

STATE OF NEW YORK:

RESIDENT ENGINEER'S OFFICE,
SYRACUSE, February 16, 1861. }

HOLMES & HUNTLY, *Contractors, Repair Section No. 3, Chenango canal.*

SIR—Herewith I send you an approximate estimate of the work which you will be required to do on your section before the opening of navigation next spring.

In order to do this work, it will require at least 150 men on the excavation, and a large force on the locks and other structures. The farm-bridge near Greene, the road-bridge at East Greene, and the waste weir near Chenango, are considered dangerous, and you are directed to rebuild them, plans for which I will furnish.

You will be expected, and are hereby directed, to put on at least the force above named, within one week, and keep them employed until the section is put in the condition required in the communication of B. F. Bruce, Canal Commissioner, dated January 29th, 1861.

I have directed O. H. Bogardus, assistant engineer, to lay out the work for you, and you will be governed by his discretion in the prosecution of the work.

Yours, &c.,

W. H. H. GERE, *Resident Engineer.*

Approximate estimate of repairs required on section No. 3, Chenango canal. HOLMES & HUNTLY, Contractors.

Quantities.	Items.
30,000 cubic yards excavation,	
5,000 cubic yards graveling,	
20 cubic yards masonry,	
20,000 feet, board measure, pine and oak,	
5,000 feet, board measure, hemlock.	
500 pounds wrought iron,	
500 pounds spike and nails,	
1 farm-bridge near Greene,	
1 road-bridge at East Greene,	
1 waste weir near Chenango.	

STATE OF NEW YORK:

CANAL COMMISSIONERS' OFFICE,
SYRACUSE, January 29, 1861. }

EDWIN W. PARK, *Repair Contractor,*
Section No. 1, Chenango Canal:

SIR: You are hereby notified that the following work will be required to be done on section No. 1 of the Chenango canal, under your contract for keeping the same in repair, before the opening of navigation next spring, viz:

The entire length of the section to be bottomed out to its original base or bottom line, and for the full width of twenty-six feet. The towing-path to be raised and graveled where it is below seven feet above canal bottom. The locks to be thoroughly repaired by substituting new timber where the old is decayed or injured, and lining the chambers of all that are defective, and the tops of the locks to be thoroughly graveled up. The trunks of aqueducts must be put in complete repair. The bridges require thorough repair, and some may require to be rebuilt.

All the masonry must be thoroughly pointed, and in case of loss or displacement of any of the stone work, the same must be replaced. Other repairs may be necessary, after a more minute examination.

You will be expected to commence this work immediately, and prosecute the same so as to insure its completion by the fifteenth day of April next.

I will direct the resident engineer and superintendent to lay out the excavation that is required to be done, and you will be governed by, and carry out such directions as they may give from time to time in reference to any of the repairs required to be done under your contract.

Yours,

B. F. BRUCE,

Canal Commissioner.

A letter, precisely like the above, except the address, was sent to Messrs. Holmes and Huntley, repair contractors on section No. 3, Chenango canal, at that time.

LAND DAMAGE CERTIFICATES.

Land damage certificates have been issued during the fiscal year ending September 30, 1861, as follows:

By J. M. Jaycox, during three months ending December 31, 1860:

On account of what canal.	Amount.
Cayuga and Seneca	\$39,881 11
Erie	20,313 30
Oswego	8,178 50
Oneida River improvement	8,433 46
Total	<u>\$76,806 37</u>

Issued by the present Commissioner from January 16 to September 30:

On account of what canal.	Amount.
Erie	\$25,026 40
Cayuga and Seneca	98 68
Oneida River improvement	635 27
Total	<u>\$25,760 35</u>
By J. M. Jaycox	\$76,806 37
By present Commissioner	25,760 35
Total for the year	<u>\$102,566 72</u>

TABLE No. 4.

Tabular Statement showing the Estimated Cost at Contract Prices, Amount of Work done in fiscal year ending September 30th, 1861, whole amount done, and Amount remaining to be done, for Repair Construction, on the Middle Division of the New York State canals.

No. of structures.	Character of work.	Estimated cost at contract prices.	Amount done in 1861.	Whole amount done.	Amount remaining to be done.
ERIE CANAL.					
	Repairs of Superintendent section No. 7	\$35,889 61	\$35,889 61	\$35,889 61	Settled.
	Repairs of " 8	27,613 96	21,180 00	21,180 00	\$6,433 96
	Repairs of " 9	6,400 00	740 00	740 00	5,660 00
	Repairs of " 9	54,237 20	54,237 20	54,237 20	Settled.
	*New bulkhead gates, Skaneateles	283 32	283 32	283 32	do
	Bottoming out canal in Syracuse	4,588 53	4,588 53	4,588 53	do
	Repairs of break in weigh-lock culvert	7,128 13	7,128 13	7,128 13	do
	Cattle-guard at nine-mile creek aqueduct	28 19	28 19	28 19	do
	Repairs to weigh-lock	17 96	17 96	17 96	do
	New scale for weigh-lock at Syracuse	3,500 00	3,500 00	3,500 00	-----
		\$139,686 90	\$127,592 92	\$127,592 92	\$12,093 96
CAYUGA AND SENECA CANAL.					
	Repairs of retaining wall on section No. 10	\$5,992 11	5,992 11	\$5,992 11	Settled.
	Repairs of Gorham bridge at Waterloo	284 10	284 10	284 10	do
	Repairs of section No. 5	720 58	720 58	720 58	do

	Repairs of section Nos. 8, 9, and 10.....	3,784 56	3,784 56	3,784 56	do
	Raising division wall and pointing old masonry, sec. 9.....	999 68	999 68	999 68	do
	Rebuilding soap-mine bridge sec. 13.....	1,522 09	1,522 09	1,522 09	do
	Rebuilding bridge at Waterloo.....	1,457 41	1,457 41	1,457 41	do
DRAINING CAYUGA MARSHES.					
		\$14,760 53	\$14,760 53	\$14,760 53	-----
Improvement of river in bars Nos. 4, 5, 7, 9 and 10..					
		\$41,970 00	\$912 14	\$27,277 14	\$14,692 86
CHEMUNG CANAL AND FEEDER.					
3	Locks Nos. 19, 27, 31.....	\$20,883 70	-----	\$20,883 70	Unsettled.
3	*Locks Nos. 35, 37, 41.....	18,022 30	-----	18,022 30	do
10	Locks Nos. 12, 14, 34, 38, 39, 42, 44, 50, 51 and 52.....	88,960 00	\$520 00	520 00	\$88,440 00
1	*Tow-path bridge over Chemung river, at Corning.....	16,283 70	4,349 70	16,283 70	Settled.
1	*Waste weir at Gibson.....	1,181 74	1,181 74	1,181 74	do
	Reconstructing berm bank on Elmira level.....	456 30	456 30	456 30	do
	Bottoming out Chemung canal.....	1,033 60	1,033 60	1,033 60	do
	*Repairing mill-bridge at Havana.....	191 21	191 21	191 21	do
	*Repairing Genesee street bridge, at Havana.....	366 50	366 50	366 50	do
	*Repairing 1,500 feet of docking at Corning.....	2,886 10	2,886 10	2,886 10	do
1	*Iron road-bridge at Elmira.....	1,104 21	1,104 21	1,104 21	do
1	Enlarging Breed's creek culvert, Bigflats.....	1,291 66	1,291 66	1,291 66	Completed.
1	Building crib in Gibson's creek.....	29 88	29 88	29 88	do
	Dredging river channel at Corning.....	1,023 88	1,023 88	1,023 88	do

* Work ordered to be performed by former Commissioner.

TABLE No. 4.—Continued.

No. of structures.	Character of work.	Estimated cost at contract prices.	Amount done in 1861.	Whole amount done.	Amount remaining to be done.
CHEMUNG CANAL AND FEEDER—Continued.					
	Protection of Mill Creek bank at Watkins.....	\$291 83	\$291 83	\$291 83	Completed.
	Rebuilding bridge over old canal at Watkins.....	350 00	350 00	350 00	do
	*Rip-rap wall at Gibson's.....	503 67	503 67	503 67	do
		\$154,860 28	\$15,580 28	\$66,420 28	\$88,440 00
CROOKED LAKE CANAL.					
1	*Bridge and retaining wall at Penn Yan.....	\$1,933 40	\$1,933 40	\$1,933 40	Settled.
CHENANGO CANAL.					
	Repairs of superintendent section No. 1.....	\$15,660 71	\$15,660 71	\$15,660 71	Settled.
	do do 3.....	13,709 59	13,709 59	13,709 59	do
	Waste weir on North Norwich level.....	452 46	452 46	452 46	do
1	Sherburne aqueduct.....	12,342 50	4,840 00	4,840 00	\$7,502 50
1	Stone and labor for Sherburne aqueduct.....	1,387 80	1,387 80	1,387 80	Settled.
1	Iron road-bridge at Norwich.....	1,209 09	1,209 09	1,209 09	do
1	Iron road-bridge at Utica.....	1,238 80	1,238 80	1,238 80	do
		\$46,000 95	\$38,498 45	\$38,498 45	\$7,502 50

OSWEGO CANAL.

Extra bottoming out between Syracuse and Salina, and raising and docking on Liverpool level.....	\$9, 100 00	\$8, 256 62	\$8, 256 62	\$843 38
Raising and leveling waste-weirs at Haskins, and section 3.....	1, 100 00	950 00	950 00	150 00
Repairing Baldwinsville dam.....	2, 500 00	1, 500 00	1, 500 00	1, 000 00
Removing cemented sand and gravel-rock at new bridge.....	1, 000 00	240 00	240 00	760 00
Constructing sluice around lock at Salina.....	1, 575 28	1, 575 28	1, 575 28	Settled.
Raising Phoenix dam.....	1, 019 95	1, 019 95	1, 019 95	do
Lowering Braddock's rapids dam.....	747 73	747 73	747 73	do
Remodeling Oswego Falls bridge.....	254 99	254 99	254 99	do
Dredging extra on river levels.....	567 50	567 50	567 50	} Not
Cutting through old coffer dam at Phoenix.....	300 00	300 00	300 00	} settled.
	\$18, 165 45	\$15, 412 07	\$15, 412 07	do
			\$2, 753 38	

* Work ordered to be performed by former Commissioner.

CORNIN

Mages Ware Ho



E.

Post Creek.

S. d'au p m S

Lum

DOCKING

umber Lots.

WASHED OUT

OLD BANK OF RIVER

NEW BANK

RIP RAP WALL

JOHN T. A. BRIDGE

Cross

Sur

12 ft.

18.0'

5'

3

11'

10.25'

CHAINS

J. BURKE, Draftsman

have been made by the engineers, taking as controlling points or monuments, the mitre sills of locks, and the bottom of the channel in the aqueducts, for the purpose of determining whether the bottom of the canal and of the respective levels thereof, were uniformly down to the bottom line as contemplated by the plan, and as indicated by said monuments. It was found upon such examination and survey, that many of the construction sections east of Lockport, which had been reported as completed by the assistant engineers in charge, whose duty it was to make the measurements, had not been excavated to bottom, several inches, in some cases, having been left above the bottom line. The Contracting Board, therefore, ordered the sections east of Niagara county thus found incomplete, together with the work for the removal of the old lock walls and temporary towing-path on section No. 207, referred to on page 86 of the last annual report, to be relet for completion, and for that purpose advertised for proposals, to be received on the 12th of December, 1861. Proposals have been received, and the work has been put under contract in pursuance thereof. These sections are, therefore, now reported uncompleted.

Of the sections and structures reported uncompleted by the last annual report and which were then under contract, the following still remain uncompleted; the present estimated cost to complete the same on the first of October, being as follows:

The sections combined or estimated together being included in one contract.

Sec. 252, and 257, near Fairport.....	\$720 00
259, } 260, } 261, } at Brighton.....	2,280 00
262, }	
1, east of Rochester.....	1,000 00
271, six miles west of Rochester, } 282, near Brockport..... } and Genesee river feeder, }	1,000 00
289, at Holley.....	1,880 00
316, at Knowlesville, } 320, at Medina, } 321, at Medina, }	4,492 00
348 to 359, including dredging Tonawanda creek	1,611 00

Sec. 361,)		
362,)		
363,)	between Tonawanda and Black Rock,..	\$35,500 00
365,)		
366,)		
364, between Tonawanda and Black Rock,...		9,100 00
6, Mountain Ridge,.....		414 00
7, do		452 00
8, do		823 00
9, do		6,498 00
10, do		778 00
13, do		509 00
14, do		2,652 00

STRUCTURES.

Waste weir on sec. 360, near Tonawanda.....	2,015 00
Ship lock at Black Rock	2,990 00
Erie basin and slips, Buffalo	16,770 00
Louisiana street bridge, Buffalo, completed.	
Iron change bridge superstructure on section 361..	193 00
<hr/>	
Estimated cost of unfinished work under contract..	\$91,640 00
Add work not under contract and reported unfinished by last annual report :	
Raising and extending Genesee river feeder dam..	6,094 00
Bridge superstructure on sec. 12, Mountain Ridge..	1,500 00
<hr/>	
Estimated cost to complete work reported uncompleted by last annual report.....	99,234 00
Add estimated cost of bottoming out and walling the sections found above bottom by the re-examination and survey above referred to, given in the groups in which they are let,	
• Removing temporary tow-path and old lock walls on sec. 207, and bottoming out, and slope walls on sections Nos. 208, 209, 212, 213, 214, 215, 216, 217, 218, 219, 228, and 229.....	10,380 00
Bottoming out and slope walls on sections Nos. 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 246, and 247....	4,750 00
The same on sections 248, 249, 250, 251, 256, 258, and 264	3,750 00

The same on sections 265, 272, 273, 275, 276, 278, 279, 280, and 281	\$4,000 00
The same on sections 287, 291, 292, 293, 294, 295, and 296	7,010 00
The same on sections 297, 298, 310, 311, 312, and 313	7,390 00
The same on sections 314, 315, and 317	6,390 00
The same on sections 318, 319, 322, 323, and 325 ..	9,250 00
Total present estimated cost of work to be done on the enlargement of the Western division of the Erie canal, if left with single locks as at present	<u>\$152,154 00</u>

By the prices at which the new contracts were made upon the proposals received on the 12th of December, the cost of the work will be considerably reduced from the estimated cost above given.

SECTION 289.

Section 289 at Holley, on which is the heavy embankment which went out by a break in May, 1859, was brought into use last spring, and has exhibited no serious indications of failure. The bank was necessarily built of sandy material, easily washed by rains, and had so suffered from this cause upon the outside slopes, that it was found indispensable to protect them with loose stone upon their entire outside face. This kind of protection to the banks was contemplated at the time of the arrangement with the contractor for the re-construction of the bank after the break, but had been partly dispensed with from motives of economy, at the time of the last annual report. Experience has shown the necessity of increasing the protection. The work is now being done, and will increase the cost of the section over last year's estimate from four to five thousand dollars.

The following remarks and recommendations, as to the Genesee river feeder dam, section 337, Lockport, and guard-lock at Tonawanda, are reiterated:

GENESEE RIVER FEEDER DAM.

The Genesee river feeder is now nearly completed, but the dam across the river, to divert the water to the feeder, has not been put under contract. This dam is referred to in the foregoing table of unfinished work. Without the dam the feeder is only

available in high water ; and though useful in filling the canal in the spring, and at other times if necessary, when the river is high, it would be useless in times of low water, however much it might be required in case of a breach or other emergency. The dam should, therefore, be constructed whenever the state of the funds will permit.

SECTION 337, IN LOCKPORT.

In the progress of the work of final enlargement on Sec. 337, owing to the want of funds to pay for this and other works, it became necessary to economize, and as far as possible, consistently with a practical use of the enlarged canal, to reduce the amount and cost of work done. For this reason, the Canal Board changed the plan for the enlargement of this section by, among other changes, and for the time being, dispensing with the construction of a new iron bridge over the canal at Exchange street, in the village of Lockport, and also by dispensing with the alterations in the waste wier in the south side of the canal in that village, which were necessary to make it conform to the increased depth of the new enlarged canal. The old bridge was of only sufficient length to span the old canal. The abutment is left projecting into the present canal several feet. This projection interferes with the laying up of boats to the docks and warehouses at its sides, and should be removed and a new bridge built.

GUARD LOCK AT TONAWANDA.

The guard-lock which had been constructed in the old canal, at the village of Tonawanda, to protect the artificial channel from the floods of Tonawanda creek, was removed and dispensed with in the enlargement. Experience and observation has shown the necessity of some means of controlling the water upon this level, and the construction of a guard-lock is recommended.

ERIE BASIN AND SLIPS.

But little has been done within the present year upon this work. By the last annual report of the Commissioner, it was stated that under the existing contract for this work, the estimates for work done and material delivered, then amounted to \$63,455.00. Up to this time such estimates amount to \$67,860.00.

Since the last report the Canal Board have ordered the plan of construction of the jetty pier to be changed by substituting stone masonry for timber. The estimated cost of which is \$16,570.

PAYMENTS.

The Commissioner in charge of the Western division, has within the year 1861, issued his drafts and certificates to the Auditor of the Canal Department for work and materials under contracts, filed in the Canal Department, and for awards of the Canal Appraisers, as follows :

Drafts on account of enlargement of Erie canal ..	\$162,399 22
Drafts for land damages of enlargement of Erie canal	2,271 04
Drafts on account of extension of Genesee Valley canal	8,228 00
Drafts for land damages and extension of Genesee Valley canal	10,762 28
Drafts for repairs upon the several repair sections of the Erie canal as hereinafter stated more in detail, in connection with the several repair sections	65,122 87
Drafts for Genesee Valley canal for repairs upon the several repair sections of the Erie canal as hereinafter stated more in detail, in connection with the several repair sections	39,956 79
Drafts for extraordinary repairs ordered by the Canal Board	9,656 63
Drafts for engineering on the Erie canal	19,492 61
Drafts for engineering on the Genesee Valley canal	2,252 68
Certificates for work and materials for enlargement of Erie canal	7,311 38
Certificates for awards for land damages of Erie canal	106,801 80
Certificates for awards for land damages of Genesee Valley canal	3,908 50
	<hr/>
	\$438,163 80

Payments in cash have been made by the Commissioner in charge during the year 1861, on account of the enlargement of the Erie canal, as follows :

For removing original materials found above bottom line of canal preparatory to navigation last spring	\$12,812 67
--	-------------

For forces put on work under contract, and which was charged to the contractors	\$1,317 16
For raising bridges	1,421 52
For old accounts or claims for temporary occupation, removing buildings, fences, &c	2,134 12
For dredging on sections 361 to 366 inclusive	751 74
For printing and publishing notices ..	515 36
For other miscellaneous payments on enlargement account	982 97
Total payments	19,935 54

PAYMENTS ON ACCOUNTS OF REPAIRS.

Payments on the several repair sections of the Erie canal, outside of repair contracts, as hereinafter stated more in detail, in connection with the several repair sections...	19,019 89
For printing and publishing notices ..	1,667 78
For clerk hire, Commissioner's traveling expenses allowed by law, fuel, rent, and other expenses of Commissioner's office	1,751 57
For other miscellaneous items	613 77

GENESEE VALLEY CANAL.

Payments for repairs on the several repair sections, outside of the repair contracts as hereinafter stated in connection with the several sections	1,624 05
For publication of notices and printing	352 49

ON CONSTRUCTION ACCOUNT OF GENESEE VALLEY AND GENESEE VALLEY EXTENSION.

For temporary occupation on Genesee Valley account	200 00
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For temporary occupation on extension account	\$250 00
Total miscellaneous payments	<u>\$45,415 09</u>
Total payments for all causes	<u><u>\$483,578 89</u></u>

NAVIGATION AND REPAIRS.

More than twenty years have passed since the commencement of the enlargement of the Western Division of the Erie canal. The suspensions and delays in the prosecution of the work by reason of the requirements of the means at command, for other and in some instances much less important parts of the public works, have caused the enlargement of the Western Division to be the last completed.

The work is now so nearly done that (except as to some delays and inconveniences resulting from the want of double locks, where they are now single) the practical benefits of the enlargement, are nearly, and by the opening of navigation in the spring may be fully realized.

The size of boats navigating the Erie canal, has been increased from about seventy by fourteen feet as they were upon the old canal, to about 100 by 18 feet as they are now; their draft of water has been increased from three feet six inches to five feet and nine inches, permitting an increase of cargo from seventy-five tons to nearly two hundred tons carried in the last season, and to two hundred and thirty tons, as they may be on the opening of navigation in the spring of 1862.

Notwithstanding the largely increased capacity of the Erie canal, so much has the business increased, that in the season last passed, the requirements for its accommodation have for weeks nearly, and at times more than equaled the capacity of the locks to meet them. It is wise to anticipate and avoid any danger of a diversion of a trade from the canals, to other more inviting, because cheaper routes.

The State has within its borders the most natural Atlantic market and outlet for the produce of the Western States, whose productive capacity is but just now beginning to be exhibited, and if the business of carrying to market these productions, and

returning the supplies required by the producers, is not done through this State, it will be because channels will be found in which it can be done cheaper.

The cost and promptness in doing the business will determine by whom, and upon what route, it shall be done. To meet the requirements of the trade, and to enable the Erie canal to do the business cheap, and without unnecessary delay, some improvements should be promptly made upon the Western Division, the most necessary of which is in the locks.

In the latter part of the past season, there have been times for several days in succession, when crowds of boats were collected at the locks, because of their inability to pass them as fast as they arrived. The most frequent and longest delays from this cause, have been at the combined and double locks at Lockport, and at the three single locks first east of Rochester.

The delays at the Lockport locks have been partly caused by the necessity of keeping the water in the lake Erie level above the height which will be required when the canal shall be completed. This has been necessary in the season passed, to overcome the difficulties arising from the unfinished state of the canal, and the progress of the work of excavation by dredging from the bottom of the canal. The effect of keeping the level too high is to overflow the lock gates and flood boats, if too many are allowed in the locks at a time.

Though the necessity for keeping the water above the height with reference to which the locks were constructed, will not hereafter exist, there should be some improvement in the Lockport locks. There will always in times of high water, and when discharging from one lock to another more water than the receiving lock will hold, be danger of overflowing the gates and flooding boats in the lock next succeeding the one so more than filled; to avoid this, means should be provided to discharge the water before it rises to the top of the locks.

In the present condition of the locks it is not usually regarded safe to allow more than three boats in each tier of locks at the same time; with the improvement suggested it is supposed at least four boats could be passing in each tier at the same time.

There is no way of moving boats towed by a team upon the towing path, from one lock to another, of the tier upon the berm side, except by hand: this, with the modern heavy boats and

cargoes, is a slow process, particularly when the service has to be performed by boatmen who have no interest to spur them to effort.

Some experiments have been made in the use of a stationary windlass or crab power, for remedying the evil, but nothing satisfactory has yet been accomplished. If no better remedy can be found, it is believed that much relief may be had by the construction of a change bridge, at the foot of the locks, and some improvements at their head, to enable the towing team to cross the canal, and pass upon the south side of the locks as they now do upon the north side.

Single locks should be doubled. The experience of the past season has very clearly demonstrated the necessity of double locks upon the entire line of the Erie canal, and has shown that it is at least doubtful whether double locks, limiting boats to the present size, will be able, without serious embarrassment, to do the business of the canal, if the cost of doing it, in comparison with other wants is so kept as to secure to the canal its proper and natural share.

But whatever may be said as to the policy of increasing the capacity of the locks, by extending their length, there is no doubt but the locks which are now single should be promptly doubled.

There are upon the western division of the Erie canal fourteen single locks, thirteen of which are between Rochester and Clyde, and the other being the guard-lock at Black Rock. It is understood that the original plan of enlargement contemplated the doubling of all the locks, and that the omission to make double locks of those referred to, has been owing to the demand for the funds at command for the supposed more pressing, and for the time, important works. Now it is believed there is no work upon the Erie canal more important than the doubling the single locks referred to.

Should the Legislature make provision for building the fourteen new locks necessary for this purpose, at an early period of the next session, the work could be let and the necessary preparations to protect it from the waters of the canal could be made before raising the water for the opening of navigation next spring, and perhaps the locks, or some of them, be completed in season for the pressure of the fall trade next season.

The estimated cost of constructing the thirteen locks between

Rochester and Clyde, for the purpose of doubling the now single locks, is.....	\$412,000
To which should be added the cost of a new lock at Black Rock, to made double locks at that point, and which it is supposed may be built for.....	25,000
Total for doubling the locks.....	<u>\$437,000</u>

CHANNEL BETWEEN TONAWANDA AND BLACK ROCK.

The entire western division of the Erie canal is mainly dependent on Lake Erie for its supply of water. The supplies from Tonawanda creek, at its junction with the canal at Pendleton, and through the Tonawanda and Oak Orchard feeder at Medina, and from the Genesee river, through the Genesee river feeder at Rochester, are not reliable; and in the present state of these feeders they are of but little use, except as aids to fill the levels on opening navigation in the spring.

Lake Erie must be looked to, and made available as the main, and except in case of exigencies as the only source of supply of water to feed 160 miles of a seven by seventy feet canal. It is believed the channel between Black Rock and Tonawanda is not of sufficient size to pass water in sufficient quantities to supply the eastern levels without creating a current, which will be found to be embarrassing to navigation, and that an increase of the width of this channel will be found to be decidedly expedient, if not imperatively necessary.

CONDITION OF THE CHANNEL LAST SPRING.

Finding on examination of the channel preparatory to canal navigation last spring, that upon many of the construction sections which had been understood to be completed, the excavation had not been carried entirely to bottom, and in view of the expected increase of the draft of water to be allowed to boats navigating the Erie canal, it was deemed indispensable to remove a sufficient part of the material so left above bottom, to ensure a sufficient depth of water for canal navigation. There was not time after discovering the necessity of the work to advertise and let it and have it completed in season for the opening for navigation in the spring. The exigencies of the case therefore made it necessary that the Commissioner in charge should cause the work to be done under his directions. He therefore directed the

several repair contractors to do the necessary excavation upon their respective sections, with the understanding that the amount of compensation therefor should be determined by the division engineer, and the respective resident engineers in charge. The work done for this purpose amounted in the aggregate, to the sum of \$12,812.67, according to the estimate of quantities and prices fixed by the division and resident engineers.

The contractors upon sections 361, 362, 363, 364, 365, and 366, were required in the early part of the season to cause to be excavated a considerable amount of material then still remaining above bottom in the channel of the canal, upon the sections referred to, endangering the continuance of navigation in case of low water in the lake and obstructing the waterway, and thereby necessarily increasing the current to the inconvenience of navigation, in order to furnish an adequate supply of water to the long line of canal dependent upon lake Erie. The contractors failed to comply with the requisition, and the Commissioner in charge therefore caused the work to be done at the cost of the contractors, except the sum of \$318.75, which was for excavation of earth from below canal bottom, on sections 361, 362, 363, 365, and 366, which were included in one contract, and \$497.00 for such excavation on section 364, which was included in another contract. The excavation of the material from below canal bottom, was not charged to the contractors, for the reason that it was not included in their contracts.

REPAIRS.

To make the canal the most efficient and useful, as well to the State as to those doing business upon them, they must be kept in thoroughly good repair, and so watched and strengthened on the first indications of failure, as far as possible to prevent breaks, and failure of structures, occasioning interruptions to navigation.

Some of the structures upon the canals are badly built; as a class, upon the western division, the culverts were the worst built—the plan was defective, as to the mode of timbering and planking bottom of water-way, and in many cases the work of construction was badly done, particularly for the want of thorough puddling, or other guards to prevent leaks from the canal around the culvert walls to their foundations.

A large proportion of the breaks which have occurred upon the

western division of the Erie canal have been caused by the failure of these structures; many of them now need overhauling and repairing; they should all be thoroughly examined, and such improvements and repairs made upon them before the opening of navigation next spring, as to secure them against all danger of failure.

The canal banks in many places have exhibited signs of failure—this has been particularly the case upon repair sections 10 and 12 of the Erie canal, where these indications have attracted more attention, and been more apparent. As the water has been raised in the channel of the canal to give the increased draft allowed to boats, the banks became saturated and much softened, occasioning in some places dangerous slides. It became indispensable to support and secure these banks, which has been done to a considerable extent, by placing upon their outside slopes loose stone in sufficient quantities to prevent their moving.

It is believed from indications already apparent that considerable more of the same, or some other kind of support will be found to be necessary to prevent the sliding and ultimate breaking of the banks, and great vigilance and watchfulness should be observed, as the depth, and consequently the pressure of the water in the channel is increased upon them.

Interruptions to navigation have several times occurred upon this division during the season last passed, from the failure, or getting out of repair of lock gates, and though this cannot always be prevented, such preparation for replacing and repairing them, may and should be made, that the delays from this cause will be comparatively unimportant.

The western division of the canals for superintendence and repairs is divided into eight repair sections, five being upon the Erie, and three upon the Genesee Valley canal. Those upon the Erie canal are sections Nos. 10, 11, 12, 13 and 14, and those on the Genesee Valley canal are Nos. 1, 2 and 3.

Of the Erie canal, sections 10 and 11 are in the charge of Nelson Drake, sections 12, 13 and 14 are in charge of Chester F. Shelley; and of the Genesee Valley canal, sections 1 and 2 are in charge of D. D. Spencer, and section 3 is in the charge of Alonzo Hawley, as superintendents of repairs.

REPAIR SECTION No. 10.

This repair section is forty-two miles long, and extends from the east to the west line of Wayne county. The section is under contract to be kept in repair by George D. Lord, assignee of John C. Hunt, the contractor, for three years from the 4th of March, 1860, for the annual compensation of \$9,439.

The following are the mechanical structures upon the section :

- 23 timber road bridges,
- 11 iron road bridges,
- 9 timber farm bridges,
- 3 waste wiers,
- 3 composite culverts,
- 19 stone culverts,
- 1 discharge culvert,
- 10 stone locks,
- 2 aqueducts,
- 4 lock houses,
- 9 watch houses, ~
- 1 work shop.

The following shows the depth, in feet, of water at the time of measurement, at the several points named upon the section, as reported by Superintendent Drake, for the several months of navigation of 1861 :

	May.		June.		July.		Aug.		Sept.		Oct.		Nov.
	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	
Clyde and Montezuma level	6	7	6	3	6	6	6	5	6	8	7	0	No report for Nov.
Between Clyde lock and lock Berlin.....	6	10	6	7	6	8	6	7	7	0	6	11	
Lyons level	6	10	6	6	6	9	6	6	6	9	6	10	
Lyons lock to Poorhouse lock.....	7	0	7	0	6	11	6	9	7	0	7	2	
Poorhouse lock to Lockville	6	11	6	10	6	10	6	8	6	9	6	10	
Two short levels at Lockville.....	7	0	7	0	7	0	6	11	7	0	7	0	
Palmyra level to Macedon.....	6	9	6	4	6	8	6	9	6	10	6	11	
Mill level at Macedon	7	0	6	9	7	0	7	0	7	0	7	3	
At Macedon, on level thence to Pittsford	6	10	6	10	6	8	6	7	6	8	7	0	

The Superintendent reports the following detentions in navigation, during the last season, on this section.

In the month of July, a detention of about four hours to repair lock gate at Poorhouse lock.

In the month of August, a detention of about eight hours by sunken boat at lower lock at Lockville.

Navigation was also interrupted on this section four days, in

the latter part of May, by a break in the towing path bank, near Port Gibson; the break was repaired partly by the contractor, and partly by a force put on by the Commissioner in charge, the expense of which was charged to the contractor, and deducted from his annual compensation. The whole cost of repairing the break, being as understood, between seven and eight hundred dollars.

The banks upon this section have in many places shown signs of failure, from the leaching of water through them, softening them, and occasioning slides; this evil was seriously increased by raising the water above the old high-water line, which was made necessary to give increased depth of water, to meet the increased draft of water allowed to boats.

This new draft upon the stability of the banks, added to the extraordinary rains of the latter part of September and fore part of October last, produced alarming signs of failure in the banks at several points, occasioning heavy slides, and made it absolutely necessary promptly to provide efficient supports and protection to the banks, to avoid the danger of serious breaks, and calamitous interruptions to the large business then doing upon the canal. To avoid these dangers, the Commissioner in charge, directed loose stone in considerable quantities to be placed upon the banks of this and other sections.

The work was done by the contractor in charge of repairs, with the understanding that the price to be paid him therefor should be fixed by the division and resident engineers.

The amount of this work upon this section, according to the estimates of quantities and prices, as so fixed by said engineers, is \$7,976.

Payments for repairs on this section, for the year 1861, have been as follows:

To the repair contractor, for his annual compensation, by draft.....	\$9,260 32
To same, amount paid by Commissioner for repair of break, and charged to contractor,.....	178 73
. Total annual compensation.....	9,439 05
To paid same for extra work, certified to by division engineer, under repair contract	739 45
Total paid for annual compensation and extra work, \$10,178 50	

Paid for other repairs on this section, to wit :		
For loose stones, as protections to prevent slides and break in banks	\$7,976 63	
For other miscellaneous items	172 40	8,149 03
Total cost of this section for the year 1861	\$18,327 53	

REPAIR SECTION No. 11.

This repair section is thirty-eight miles long, and extends from the east line of Monroe county to the west line of construction section No, 284, at the village of Brockport.

The section is under contract to be kept in repair by Chauncey Dodge, assignee of Myron H. Mills the original contractor, for three years from the 1st of October, 1859, for the annual compensation of \$8,280.

The following mechanical structures are upon this section :

- 6 lift locks,
- 1 guard-lock,
- 1 weigh lock,
- 2 stop gates,
- 1 aqueduct,
- 6 waste weirs,
- 41 culverts,
- 2 wooden farm bridges,
- 13 wooden road bridges,
- 22 iron road bridges,
- 3 wooden tow-path bridges,
- 1 iron tow path bridge,
- 4 lock houses,
- 1 work shop,
- 5 watch houses,
- 1 dam.

The following table shows the depth in feet of the water upon the section, at the points named, as reported by Superintendent Drake :

	May.		June.		July.		Aug.		Sept.		Oct.		Nov.
	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	
Pittsford	7	0	6	9	6	11	6	9	7	0	6	11	No report.
Pittsford to Brighton	7	0	7	0	6	10	6	11	6	10	6	10	
Short levels at Brighton .....	.....		.....		7	0	7	0	7	0	7	0
Rochester weigh lock	6	11	6	8	6	9	6	7	6	9	6	11	
Henpeck, 8 miles west of Rochester	7	0	.....		6	10	6	8	6	9	6	11
Brockport	7	0	6	7	6	10	6	10	6	10	7	0	

The following detentions to navigation on this section, during the past season, are reported by the superintendent, to wit:

A detention of six hours in the month of June at Brighton lock by unshipping a lock gate.

In July, a detention of about four hours to repair lock at Brighton.

In August, a detention of about five hours by breaking of paddle gate at Brighton lock. Also a detention of three days (26 to 29th August) to repair lock gates at Pittsford, which were torn out by a boat.

In October, a detention of seven hours, by a boat sinking across the canal at Brighton. In addition to the detentions upon sections 10 and 11, from temporary causes, reported by the superintendent, and above stated, should be mentioned the delays arising, from the want of capacity of the single locks, upon these sections, to pass the boats promptly as they arrive, and also delays caused by the necessity to stop locking boats, in order to feed through the locks to keep up the levels. This is a serious and frequent cause of delay, and should be promptly remedied.

Some provision was made in the construction of the canal and locks referred to, for feeding from one level to another around the locks, but the means provided are entirely inadequate to the object, it being impossible to pass through the sluices made for the purpose sufficient quantities of water to keep up the levels, if the large amount required during the last season of navigation is to be regarded as the test or guide for the future.

The detention in navigation, on account of the want of capacity in the single locks to pass all the boats promptly, has been the most serious at the locks upon this section, first east of Rochester, where the cause of the delay with eastern bound boats is first met with, and it is believed this has been in the last season much the most serious cause of delay of any upon the section.

It was found necessary, for the reasons before stated, to support the banks with loose stone in several places upon this section to prevent breaks. The cost of this work on this section, according to the estimate of quantities and prices fixed by the engineer is \$3,263.

It has been necessary too, during the season last passed, to raise and strengthen the banks across the Irondequoit valley, and also to protect them by a more substantial material, than was used in their construction.

The towing path and berm banks, it is believed, were not originally built high enough for seven feet depth of water, and the natural compression and settling of the light material of which they are composed.

They were found too low and not heavy enough for safety, and the Commissioner in charge, therefore directed them to be raised and strengthened by increasing their thickness, and (the material of which the banks were built being so light that the banks had, in places, become materially wasted by the action of the winds) the Commissioner also directed them to be protected by a coating of gravel.

This work was done by the repair contractor, under that provision of his contract, entitling him to the difference between the cost of repairs made pursuant to the old plan, and such cost, if they are made pursuant to a change of plan; such difference to be determined and certified by the division engineer. Such difference in this case, as so certified by said engineer, is,

Payments for repairs on this section, for the year 1861, have been as follows :

To the repair contractor for his annual compensation,		
by draft,.....	\$8,280	00
Paid same for extra work, certified to by division en-		
gineer, under repair contract,.....	1,922	93
	<hr/>	
Total paid for annual compensation and extra work.	\$10,202	93
To paid for other repairs on this section, to wit :		
For loose stone to prevent slides and		
breaks in banks,.....	\$3,263	15
For other miscellaneous items, includ-		
ing an award of \$210.00 to A. H.		
King, late superintendent, under		
chapter 331, Laws of 1861,.....	347	50
	<hr/>	
		\$3,610 65
Total cost of repairs on this sec-		
tion for 1861,.....	\$13,813	58
	<hr/> <hr/>	

REPAIR SECTION No. 12.

This repair section is thirty miles long, and extends from the west end of construction section No. 284, at Brockport, to the west line of the county of Orleans. The section is under contract to be kept in repair by Lewis M. Loss, contractor, for three

years from the 1st day of May, 1859, for the annual compensation of \$3,453.

The following are the mechanical structures upon the section :

- 7 waste weirs,
- 43 culverts,
- 11 road iron bridges,
- 20 road wood bridges,
- 3 farm wood bridges,
- 1 aqueduct,
- 1 bulkhead, for feeder,
- 1 dam, for feeder.

The following table shows the depth of water on the section, as reported by Superintendent Shelly, at the points, and at the times of the measurement in the months stated, at

	May.		June.		July.		Aug.		Sept.		Oct.		Nov.	
	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.
Culvert west of Shelby Basin.....	7	0	7	3	7	3	.....	.....	.....	.....	.....	.....	.....	.....
Bridge at Shelby Basin.....	6	11	6	7	6	7	7	0	.....	.....	7	1	.....	.....
Culvert east of Shelby Basin.....	6	3	7	3	7	3	.....	.....	.....	.....	.....	.....	.....	.....
West of Medina stop-gate.....	6	8	7	3	7	3	.....	.....	.....	.....	.....	.....	.....	.....
Medina aqueduct.....	6	2	6	5	.....	.....	6	9	.....	.....	6	10	.....	.....
First bridge east of Medina.....	7	0	7	3	7	3	7	0	.....	.....	7	1	.....	.....
Hastings' Bridge.....	6	6	6	8	6	8	6	8	.....	.....	.....	.....	.....	.....
Road culvert.....	6	0	6	8	.....	.....	6	6	.....	.....	6	7	.....	.....
Half mile west of Knowlesville.....	6	2	6	5	6	5	.....	.....	.....	.....	.....	.....	.....	.....
Culvert at do.....	6	6	6	9	6	9	.....	.....	.....	.....	.....	.....	.....	.....
Bridge at do.....	7	0	7	3	7	3	.....	.....	.....	.....	.....	.....	.....	.....
First culvert east of do.....	6	3	6	6	6	8	.....	.....	.....	.....	.....	.....	.....	.....
Delano's culvert.....	.....	.....	7	9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Culvert west of Eagle Harbor.....	6	6	6	9	6	9	.....	.....	.....	.....	.....	.....	.....	.....
Bridge at Eagle Harbor.....	6	5	6	8	6	8	.....	.....	.....	.....	.....	.....	.....	.....
Bridge at Gaines' Basin.....	6	9	7	0	7	0	7	0	.....	.....	7	0	.....	.....
Lattin's Bridge, near Albion.....	6	9	7	0	7	0	7	0	.....	.....	7	0	.....	.....
Culvert east of Albion.....	6	10	6	11	6	11	.....	.....	.....	.....	.....	.....	.....	.....
Main Street Bridge, Albion.....	6	6	6	9	6	10	7	4	.....	.....	7	4	.....	.....
Braley's Bridge.....	6	9	7	0	7	1	.....	.....	.....	.....	.....	.....	.....	.....
Bidwell's Bridge.....	6	9	7	0	7	1	7	0	.....	.....	.....	.....	.....	.....
Culvert at Hindsburgh.....	6	3	6	6	6	7	.....	.....	.....	.....	.....	.....	.....	.....
Bridge at do.....	6	3	6	6	6	7	6	10	.....	.....	6	10	.....	.....
Bridge at Hulberton.....	6	4	6	7	6	8	6	8	.....	.....	.....	.....	.....	.....
Stop-gate at Tuttle's Bridge.....	6	1	6	4	6	5	.....	.....	.....	.....	.....	.....	.....	.....
Big bank at Holly.....	6	9	7	0	7	1	7	4	.....	.....	7	4	.....	.....
First bridge east of Holly.....	6	8	6	11	7	0	.....	.....	.....	.....	.....	.....	.....	.....
First bridge west of Brookport.....	7	3	7	0	7	1	10	0	.....	.....	10	0	.....	.....
Third do do.....	.....	.....	.....	.....	.....	.....	10	0	.....	.....	10	0	.....	.....
Waste weir at do.....	.....	.....	.....	.....	.....	.....	8	0	.....	.....	8	0	.....	.....

A break occurred on this section on the sixth of July last, about one mile west of Albion, from a not uncommon cause, the failing of a culvert. Navigation was interrupted four days. The break was repaired at the cost of the contractor, of about \$600.00, and to the State of \$165.00, the latter amount being the increased cost by reason of changing the plan as certified by

the division engineer, and to which the contractor was entitled by the terms of his contract.

A serious break also occurred on this section on the 27th September last, by giving way of the berm bank of the old canal at the village of Holly, resulting, before the destruction could be stopped, in the washing out of nearly the whole of the heavy embankment of the old canal across the gorge or ravine at that place.

Fortunately for the navigation and business of the canal, the new line of enlarged canal at this place had been brought into use last spring, and was used as the main channel for navigation as well before as after the break.

It was only necessary therefore to throw a dam across the old canal on each side of the break, to restore navigation. Such dams were made and navigation restored in about forty-eight hours from the time of the break. The dams were so located as that all the storehouses upon the canal are still accessible by boats.

The work was done under the direction of the Canal Commissioner in charge, at a cost of \$532.44, which was charged to the repair contractor and deducted from his annual compensation.

This part of the old canal has not been strengthened and prepared for the increased pressure upon its banks of a body of seven by seventy feet of water, instead of four by forty, for which it was made.

The line of enlargement of the canal at this point, is a new line leaving an extensive bend in the line of the old canal at the south of it, thereby straightening the line and considerably reducing the distance; the new line which involved the building of a heavy embankment across the ravine which necessarily required considerable time, and it became necessary to deepen the channel of the old canal to prepare it for temporary use, in connection with the enlarged canal while the new line was being built. Not knowing whether the old line would also be permanently continued, and on account of the limited means at command for the public works, as little was done upon this old line as was regarded at all consistent with its safety.

The deepening of the channel may have tended to weaken the banks and to render them still more incapable of sustaining the pressure of the increased volume of water thrown upon them.

The banks were well watched, and the failure was without any previous indication or warning.

A question of some importance is now presented, which is, whether this break shall be repaired, the bank restored, and with other parts of the old line strengthened and fitted for the increased amount of water required for the enlarged canal, or whether it shall be abandoned, and by dams cut off from the present new line.

To accomplish the first object it is supposed will cost twenty-five thousand dollars.

The State has no interest or object in keeping up this old line, except to accommodate the people and business of the village of Holley; and if it should be determined to abandon it, perhaps it would be but just to compensate those injured for the losses sustained.

Holley is an incorporated village, and legislation is required to abandon or discontinue the old canal.

For reasons before stated, it was found necessary to sustain the banks in several places upon this section with loose stone, the amount expended for that purpose being \$2,257.46, according to the estimates of quantities and prices fixed by the division and resident engineers.

SECTION 12, ERIE CANAL.

Payments for repairs on this section for the year 1861 have been as follows :

To the repair contractor for his annual compensation, by drafts	\$2,798 00
To same, paid by Commissioner, for repairs of culvert, and charged to contractor	165 75
For restoring navigation after break at Holley	532 44
<hr/>	
Total annual compensation	\$3,496 19
Paid same for extra work, certified to by division engineer under repair contract	453 20
<hr/>	
Total paid for annual compensation and extra work	\$3,949 39
[Assembly No. 9.]	9

To paid for other repairs on this section, to wit :		
For loose stone, to prevent slides and breaks in banks.....	\$2,257 46	
For other miscellaneous items	255 46	
		2,512 92
Total cost of repairs on this section for 1861....	\$6,462 31	

REPAIR SECTION No. 13.

This repair section is twenty-six miles long, and extends from the west line of Niagara county, to and including Pickard's bridge, across the Tonawanda creek.

The following are the mechanical structures on the section :

- 21 culverts,
- 2 state races,
- 4 waste weirs,
- 10 lift combined stone locks,
- 1 guard stone lock,
- 14 wood road bridges,
- 13 iron road bridges,
- 2 wood farm bridges,
- 1 iron towpath bridge,
- 4 wood towpath bridges,
- 1 wood foot bridge.

The following table shows the depth of water on the section, as reported by Superintendent Shelley, at the points and at the time of the measurements, in the months stated :

	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.
<i>Tonawanda Creek.</i>							
Pickard's Bridge.....	10 0	10 4	10 3				
End of sections 352 and 351	9 6						
Opposite Widow Becker's	8 6						
do New Home Road.....	9 6						
do Col. Warren's.....	12 0						
do Black Creek.....	12 0						
do Ransom Creek.....	10 0	10 0	9 11				
do Root's	7 6						
do Johnson's—Pendleton	9 6	9 4	9 3	9 0		10 0	
do Bear Ridge Road		8 0	7 11				
Artificial channel, iron br., Pendleton.....	7 6						
End of sections 13 and 14, Mount'n Ridge..	8 2						
do do 12 and 13, do	9 6						
Intersection old canal at McAdams'	8 0						
End of sections 11 and 12, Mount'n Ridge..	8 6						
Ten chains above Sulphur Springs	9 4						
Mitre sill, Sulphur Spring guard lock	9 10	9 8	9 7		11 0	10 10	
End of sections 10 and 11, Mount'n Ridge ..	9 0						
Sulphur Spring House, do	8 6						

	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
<i>Tonawanda creek—Continued.</i>	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.
End of sections 9 and 10, Mountain Ridge.....	9 6	9 4	9 3	.....	.....	.....	.....
Station 16, section 9, do.....	7 8	.....	.....	.....	.....	.....	.....
Hawley's Bridge, do.....	7 10	.....	.....	.....	10 0	.....	.....
do grocery, do.....	.....	9 2	9 1	.....	.....	.....	.....
Heacox Bridge, do.....	8 6	9 4	9 3	.....	10 5	10 3	.....
End of sections 5 and 6, do.....	8 9	.....	.....	.....	.....	.....	.....
do do 4 and 5, do.....	9 0	.....	.....	.....	.....	.....	.....
Through rock to Lockport locks.....	9 0	9 4	9 3	.....	9 to 11	.....	.....
<i>Genesee level.</i>							
Lower mitre sill of Lockport locks.....	5 9	6 0	6 0	.....	6 0	6 0	.....
One hundred feet east of Lockport locks.....	6 1	.....	.....	.....	.....	.....	.....
Three hundred feet east of Lockport locks.....	7 0	.....	.....	.....	.....	.....	.....
Waste wier, lower Lockport.....	7 3	.....	.....	.....	.....	.....	.....
Culvert at Chapel Street.....	6 10	.....	.....	.....	.....	.....	.....
End of sections 336 and 337.....	7 0	.....	.....	.....	.....	.....	.....
do do 335 and 336.....	6 9	.....	.....	.....	.....	.....	.....
Culvert at Kilborn's.....	6 5	.....	.....	.....	.....	.....	.....
Wakeman's Culvert.....	7 3	7 6	7 6	.....	.....	.....	.....
Stop gate on section 335.....	7 4	.....	.....	.....	.....	.....	.....
Bridge on sections 334 and 335.....	7 4	.....	.....	.....	.....	.....	.....
Culvert at Wilson's.....	12 0	.....	.....	.....	.....	.....	.....
Middle section 334.....	6 9	.....	.....	.....	.....	.....	.....
Millard's culvert.....	7 6	7 9	7 9	.....	.....	.....	.....
do Bridge.....	6 9	.....	.....	.....	.....	.....	.....
End of sections 333 and 334.....	7 4	.....	.....	.....	.....	.....	.....
Sand bank near Robinson's break.....	6 9	.....	.....	.....	.....	.....	.....
Robinson's break.....	7 10	.....	.....	.....	.....	.....	.....
Middle section 333.....	6 10	.....	.....	.....	.....	.....	.....
Culvert at Phelps's.....	7 3	7 6	7 6	.....	.....	.....	.....
End of sections 332 and 333.....	6 8	.....	.....	.....	.....	.....	.....
Twelve chains west of Orangeport Bridge.....	6 9	.....	.....	.....	.....	.....	.....
Three do do do.....	6 9	.....	.....	.....	.....	.....	.....
Orangeport Bridge.....	7 2	.....	.....	.....	.....	.....	.....
End of sections 331 and 332.....	6 8	.....	.....	.....	.....	.....	.....
Cataract Spring house.....	7 3	7 6	7 6	.....	.....	.....	.....
Gasport culvert.....	6 11	7 2	7 2	.....	.....	.....	.....
do Bridge.....	6 11	.....	.....	.....	.....	.....	.....
Hurd's Bridge.....	.....	7 0	7 0	.....	.....	.....	.....
End of sections 330 and 331.....	7 3	.....	.....	.....	.....	.....	.....
Mabee's, or Eighteen Mile Creek culvert.....	7 4	.....	.....	.....	.....	.....	.....
do Bridge.....	6 11	.....	.....	.....	.....	.....	.....
End of sections 329 and 330.....	7 2	.....	.....	.....	.....	.....	.....
Culvert west of Reynales Basin.....	6 8	.....	.....	.....	.....	.....	.....
Bridge, Reynales Basin.....	6 9	.....	.....	.....	.....	.....	.....
Two chains east of Reynales Basin.....	6 6	.....	.....	.....	.....	.....	.....
Johnson's Creek culvert.....	6 9	.....	.....	.....	.....	.....	.....
Near Watson's Bridge.....	6 5	.....	.....	.....	.....	.....	.....
Three chains west of Williams' Bridge.....	6 8	.....	.....	.....	.....	.....	.....
Williams' Bridge.....	.....	6 11	6 11	.....	.....	.....	.....
Middleport waste wier.....	6 5	.....	.....	.....	.....	.....	.....
do Bridge.....	6 10	7 1	7 1	7 0	7 2	.....	.....
Front of docks at Middleport.....	.....	7 1	7 1	.....	.....	.....	.....
V Street Bridge, do.....	6 8	.....	.....	.....	.....	.....	.....
Two chains east of bridge at Middleport.....	6 8	.....	.....	.....	.....	.....	.....
First culvert east of Middleport.....	6 2	.....	.....	.....	.....	.....	.....
End of repair sections 12 and 13.....	6 8	.....	.....	.....	.....	.....	.....

Some repairs were made, not within the repair contract, upon this section during the last season, the most important of which are the rebuilding of the wall for the protection, or upholding of a towing path bank at Middleport, at a cost of \$1,347.03; the repair of the Mabee waste wier, at a cost of \$90.48; building horse pass and change, and repair of the State culvert at Lock-

port, at a cost of \$1,507.85; repairing docking and sheet piling at Pendleton, at a cost of \$347.02; the repair of the locks at Lockport, with their gates and paddles, at a cost of about \$2,200.00, all of which were anticipated and referred to in the last annual report, on pages 97 and 98.

The work of repair of the State culvert was necessarily delayed until so near the time for opening the canal, and bringing the work into use in the spring, that time was not allowed for the masonry to set sufficiently to resist the severe pressure of the water upon it, the consequence was, it partially failed, and must be rebuilt before the opening of another navigable season.

Superintendent Shelley reports that the following repairs have been made upon this section, to wit: A new bridge over the State ditch at Bear Ridge road, at a cost of \$175; a new bridge over the State ditch at James McAdams, at a cost of \$275.00, and the repairs of the Transit street bridge, in the village of Lockport, at a cost of \$60.00, which have been done by the repair contractor.

Besides those referred to, the contractor has made other repairs, such as new timbers in docking through the rock cut at Lockport; new protection railing along the high banks in Lockport, and ditching back of, and graveling, and repair of towpaths.

The superintendent also reports that on two different occasions serious delays in navigation have been caused in the past season by freshets, and the consequent rise of water to such an extent that it became necessary to close the guard-lock at Sulpher Springs, thereby interrupting a supply of water adequate to keep up the level below the guard-lock, and to feed the Genesee and eastern levels.

In the construction of the guard-lock referred to, small gates were made, through which to pass water to feed the levels east, but are insufficient for the purpose. Either larger or an increased number of gates should be promptly made for this purpose.

The superintendent also recommends the construction of a rack at the guard-gates, on the east side of the canal, at the guard-lock referred to, to prevent the accumulation of flood-wood against these gates, thereby partially interrupting the flow of water through the small gates made in the large guard-gates for the passage of water when the large gates are closed.

The superintendent reports that on two different occasions delays occurred at the Lockport locks, at one time one day, and at the other half a day, by the getting out of repair of the small gates, through which the water is drawn into and from the locks.

That, except as above stated, there has been no material delay at the Lockport locks, by the failure or getting out of repair of those structures, but that delays have occurred from inability to pass the boats through the locks, at all times, as fast as they arrive. This subject has been before referred to.

The serious break which occurred upon this section on the 29th of November, 1860, alluded to on page 96 of the report for last year, was repaid in season for the opening of navigation last spring, at a cost of \$12,926.00.

Payments for repairs on this section for the year 1861 have been as follows :

To the repair contractor for his annual compensation, by drafts.....	\$6,071 31	
To the same, paid by Commissioner, for raising boats at Pendleton, and charged to contractor.....	75 00	
To the same, paid by Commissioner, for repairing towpath at Lockport.....	101 13	
	<hr/>	
Total paid on account of annual compensation..		\$6,247 44
To paid contractors for repairing break of Nov. 1860.....	\$8,991 08	
To paid contractors for repairing culvert of 1860.....	3,934 94	
	<hr/>	
		12,926 02
To paid for other repairs on this section, to wit:		
To paid old account of Hayes & Rigney removing boats.....	\$300 00	
To paid old account of Hinman & Lewis for dam on section 10, Mountain Ridge.....	397 50	
To paid old account of B. F. Gaskill, for gravel.....	250 00	
To paid account of Wm. Robinson, borrowpit for break.....	249 00	
To paid loose stone on bank.....	195 25	
To paid excavation of rock found above bottom line.....	180 11	
	<hr/>	
		1,571 86
To other miscellaneous payments...		676 08
		<hr/>
Total cost of repairs on this section for 1861.....		\$21,421 40

Add expenditures, as per abstracts of late superintendent, L. E. Harris .	\$5,181 26	
Add expenditures, as per abstracts of Superintendent C. F. Shelley -----	6,662 00	
	<hr/>	\$11,843 26
		<hr/>
		\$33,264 66

REPAIR SECTION No. 14.

This repair section is seventeen miles long, and extends from Pickard's bridge across the Tonawanda creek, to the city of Buffalo. The section is under contract to be kept in repair by William H. Douglas, contractor, for three years from the 1st day of March, 1860, for the annual compensation of \$14,500.

The following mechanical structures are upon this section :

- 44 road bridges,
- 55 farm bridges,
- 3 culverts,
- 2 locks,
- 1 ship lock,
- 2 foot bridges,
- 1 stone pier at Black Rock harbor,
- 1 protection pier, or break-water, for the basin.

The following table shows the depth of water on this section, as found and reported by Superintendent Shelley, at the times of the measurement in the several months stated.

	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.
Buffalo—Commercial slip at junc. with canal.....	10 6	8 7	8 8	9 0			8 5
Prime Street Bridge.....	7 6						
One chain above bridge.....	8 6						
Water Street Bridge.....	7 9	8 0	8 1	8 5			7 10
Junction with Buffalo creek.....	9 0	10 5	10 5	10 10			
<i>On Main and Hamburg Street Canal.</i>							
Lloyd Street Bridge.....		9 0	9 1	9 5			8 10
Between Main and Washington street.....	9 10						
Main Street Bridge.....		11 6	11 7	11 11			11 4
Washington Street Bridge.....	10 4	10 6	10 7				10 4
Clark and Skinner canal.....	8 9						
Michigan street.....	7 8		8 9	9 1			
Ohio Basin—from.....	7 5	7 4	7 4	11 0			11 0
Ohio Basin—to.....	11 6		12 2	12 0			12 0
Clark and Skinner canal—from.....		4 7	4 7	5 1			4 7
Clark and Skinner canal—to.....		5 8	5 9	6 1			5 6
<i>Erie Canal.</i>							
Commercial street.....	7 9	7 0	7 1				
Evans street.....	7 0	7 0	7 1				
Erie street.....	7 0	7 6	7 7				
Slip No. 1.....	9 2	7 3	8 1	10 1			
Slip No. 2.....	11 0	8 0	8 1	10 1			
Slip No. 3.....	9 5						
One chain north of slip No. 3.....	6 8			9 0			
Towpath Change Br., York street.....	9 6						9 6
Railroad Bridge.....	9 0	9 0	9 1				
Perry street.....	9 6	9 6	9 7				
About one chain below end of sections 368-9.....	9 8						
Four chains above bridge to Ship Lock.....	6 0	6 0					10 0
Amherst street.....	10 0						
One chain above Guard Lock.....	9 2			11 00			
Mitre sill lower end Guard Lock.....							10 0
Three chains below do.....		8 7	8 6				
Towpath Change bridge.....	8 6	8 9	8 8				8 7
Station 60—section 366.....	6 2						
Station 40—section 366.....	9 0						
End of sections 365 and 366.....	6 2						
Station 75—section 365.....	6 2						
Three chains west of Scott's Bridge.....	9 4	9 2					
Section 363 at Cherry Bridge.....	6 6			9 6			
End of sections 361 and 362.....	6 0						
Two mile creek.....	8 2	8 0	7 11				
End of sections 360 and 361.....	7 8						
State Ditch Culvert, Tonawanda.....	7 6						
Military Road Bridge.....	8 6						
<i>Tonawanda Creek.</i>							
End of sections 359 and 360.....	9 8						
Station 20 on section 358.....	7 6						
End of sections 356 and 357.....	9 9						
Rapleyea's.....	6 6						
Ackerman's.....		10 4	10 3				
Pickard's Bridge.....		10 4	10 3	11 0			

Some delays in navigation have been caused upon this section, by the inability to pass the boats through the guard lock at Black Rock, at all times, as fast as they arrived, and also by the prosecution of the work of enlargement between Black Rock and Tonawanda. The addition of another lock at Black Rock is recommended as a remedy for the difficulty above referred to.

It was found necessary to deepen the channel on this repair section at Buffalo and its vicinity, in order to carry it to bottom, as contemplated by the plan, and to avoid danger of interruption to navigation in case of low water in Lake Erie; to this end original material had to be removed as well as deposits.

Payments for repairs on this section for the year 1861, have been, as follows:

To the repair contractor for his annual compensation by draft.....	\$12,828 18
To paid for other repairs on this section, to wit:	
For sluice under tow-path	\$31 38
For cutwater and protection for boats at Genesee street bridge in Buffalo.	638 81
For railing to tow-path bridge in Buffalo	6 54
For protection piling to prevent tow-path from sliding.....	769 57
	<hr/> 1,446 30
Total cost of repairs on this section for 1861,	<hr/> \$14,274 48

GENESEE VALLEY CANAL.

The condition of the Genesee Valley canal proper, being the original line from Rochester to Olean; so far as relates to the work of construction remains the same as at the last annual report of the Canal Commissioners.

The two locks to connect the canal with the Allegany river at Olean, according to the original plan, not having been built. The Commissioner in charge has nothing to add to what he said at page 103 of his report of last year as to the necessity or propriety of building these locks.

EXTENSION OF THE GENESEE VALLEY CANAL.

The extension of the Genesee Valley canal, from Olean to Millgrove pond is claimed by the contractor to be completed, though it has not yet been so reported by the engineers, nor have they examined it with a view to a decision as to its completion.

In his last report the Commissioner in charge urged the necessity of a guard-lock near the junction of the extension with the Allegany river to protect the canal from the floods of that stream.

Since that time the subject has been presented to the consideration of the Canal Board upon the recommendation of the division engineer and approval of the Commissioner in charge; and that Board being satisfied of the necessity of the work to the safety of the canal, made the requisite order for the construction of the work.

The contractor entered upon the work soon after such order of the Canal Board, and claims that the lock is now completed.

The estimated cost of the lock is about seven thousand dollars.

NAVIGATION AND REPAIRS.

The Genesee Valley canal has been kept in as good repair, and the navigation thereof for the season of 1861 has been as little interrupted as in any year since its completion, until the 27th of September last, when by a freshet it is believed unprecedented in severity, its banks and structures were so destroyed that navigation from Mt. Morris to Olean, including the Dansville side cut was necessarily suspended for the season.

The destruction is of canal banks, aqueducts, bridges, and in some places, the entire loss of the canal, by the washing away of the banks, or filling up the channel by deposits, or both.

On repair section No. 1, the aqueduct at Shaker Village was entirely destroyed, together with a large amount of canal banks upon the main canal, and much damage was done by the carrying away the banks and filling up the channel on the Dansville side cut and feeders.

The damage upon section one, is estimated by the engineer in charge, at twelve thousand dollars.

ON REPAIR SECTION No. 2.

The damage consists principally of nearly the entire destruction of the banks with their protection works for about three miles south from the Shaker Village.

Breaks in the banks at many other points, the carrying out of Cole creek aqueduct, and the bad break in the feeder at Black creek.

The engineer in charge estimates that it will cost \$23,000 to reconstruct the canal and structures on section two, according to the old plan, and that new protection works and materials must be added as a guard against future freshets, to the amount of \$13,000.

ON REPAIR SECTION No 3.

The principal damages are from a break in the bank of the Rockville reservoir. These were small breaks and washing of banks at many places on the whole line of the section, including the extension.

The engineer in charge estimates the cost of repairing the section according to the old plan, at \$6,000, and that \$4,000 should be added for new protection works, to guard against future freshets.

REPAIR SECTION No. 1.

This repair section, together with repair section No. 2, is in the charge of D. D. Spencer, as superintendent of repairs.

The section is fifty-two miles long and extends from the junction of the Genesee Valley canal with the Erie canal at Rochester, to the terminus of the Dansville side cut at Dansville.

The mechanical structures upon the section are as follows :

- 19 lift locks,
- 3 guard-locks,
- 4 dams,
- 3 bulkheads,
- 8 aqueducts,
- 57 culverts,
- 15 waste wiers,
- 44 road bridges,
- 64 farm bridges,
- 3 tow-path bridges,
- 11 lock houses.

At the time of the freshet before referred to, the section was under contract to be kept in repair by Alfred C. Dodge, contractor, for three years from the first day of May, 1859, for the annual compensation of \$4,800, besides nine cents per cubic yard for the excavation and removal from the channel of the canal, a large quantity of deposit which had been suffered to accumulate by former superintendents, and was found in the canal at the time the section was put under contract; about 130,000 cubic yards of said deposit have been removed from the channel of this section since May, 1859, according to the estimate of the engineer in charge.

After the heavy destruction by the freshet on the 27th of September last, before alluded to, the contractor upon the section

declined to proceed to make the required repairs, and the Contracting Board on filing the certificate of the engineer in charge, of that fact, in pursuance of the terms of the contract, declared the same abandoned, and directed that the bond of the contractor and his sureties, be placed in the hands of the Attorney General for prosecution as required by law.

The repairs of the section are therefore now progressing at the expense of the State, under the direction of the superintendent.

The Board also determined that the section should be again put under contract for repairs, and for that purpose advertised for proposals to be received on the 28th of December inst., 1861, at the Canal Commissioner's office in Lockport, the contract to take effect on the first of February next.

Proposals were received in pursuance of such advertisement and the contract awarded to John W. Graves, the lowest bidder.

From the report of Superintendent Spencer, the depth of water upon section 1, at the points and times of measurement in the months stated, has been as follows :

	May.	June.	July.	Aug.	Sep.
	ft. in.	ft. in.	ft. in.	ft. in.	
Lock No. 1, above and below.....	4 6	4 0	4 0	4 0	No report.
do 2, do	4 4	4 0	4 4	4 0	
do 3, do	4 6	4 0	4 6	4 0	
Cox's Basin	4 0	4 0	4 6	4 0	
Sacket's Basin	4 0	4 0	4 4	4 0	
Lock No. 5, above and below.....	4 4	4 0	4 4	4 0	
Spencerport	4 0	4 0	4 4	4 0	
Lock No. 6, below	4 0	4 4	4 7	4 4	
Piffardina	4 0	4 0	4 0	4 0	
Cuylerville	4 6	4 0	4 5	4 0	
Lock No. 8, above and below.....	4 0	4 0	4 6	4 8	
Channel in Genesee river.....	4 to 6	4 to 6	4 to 6	4 to 6	
Lock No. 10, above	4 6	4 6	4 6	4 6	
Shakers	4 4	4 4	4 4	4 0	
Rock Spring	4 4	4 0	4 4	4 0	
Woodville	4 6	4 0	4 4	4 4	

The only interruption or detentions in navigation reported by the superintendent upon this section, are the following :

In the month of July a detention of twenty-four hours occasioned by a slide in the towing-path bank at the high embankment at Mt. Morris.

In the month of August, a detention of two days at Mt. Morris, occasioned by low water in the Genesee river.

The superintendent reports that the following repairs have been made on the section in the last season, to wit :

Six new lock gates made and put in, and other repairs to paddle gates.

Eight bridges repaired.

Repair of Canaseraga dam, and considerable bottoming out between sections 29 and Mt. Morris, and on section 12, in all about eight miles.

The superintendent also reports that the section will require considerable repairs to insure good navigation the next season; that many of the locks will require new gates and paddles.

Eight or ten of the waste weirs to be rebuilt, considerable repairs on Mt. Morris dam; three new bridges to be built, and many of the others need thorough repairs.

Payments for repairs on this section for the year 1861, have been as follows:

To the repair contractor for his annual compensation by drafts.....	\$4,120 00	
To the repair contractor for excavation under his contract.....	2,060 00	\$6,180 00
To same for extra work, certified by Division Engineer under repair contract.....		694 65
		<hr/> \$6,874 65
To paid for other repairs on this section, to wit:		
For raising the banks of the level at Rochester on this canal to meet the increased height of water in Erie canal.....	\$676 16	
For float and scraper, bought of former and sold to present contractor.....	100 00	
For repairing bridges at Rochester....	77 63	
Transportation of pile-driver from Geneva to aqueduct at Shakers.....	21 26	
	<hr/>	875 05
Total amount paid by Commissioner for repairs on this section		\$7,749 70
To which amount add expended by superintendent in repairing aqueduct at Shakers, and other breaks, caused by the freshet of September last, as far as the same have been reported to the Commissioner in charge.....		6,509 43
Total cost of repairs on this section for 1861.....		<hr/> \$14,259 13

REPAIR SECTION No. 2.

This repair section is thirty-six miles long, and extends from the junction of the canal with the Dansville side-cut at the Shakers' settlement to and including the Genesee River feeder at Oramel.

The mechanical structures upon the section are the following:

- 61 lift locks,
- 1 guard-lock,
- 1 dam and bulkhead,
- 7 aqueducts,
- 30 culverts,
- 9 waste weirs,
- 35 road bridges,
- 28 farm bridges,
- 4 tow-path bridges.

Since the last annual report the contract of Myron Bangs to keep the section in repair has expired.

The section was again put under contract to be kept in repair by John Lambert for five years, from the fifteenth day of March last, for the annual compensation of \$12,540.00.

Said Lambert by the consent of the Canal Commissioners assigned his contract to George D. Lord, who is now in charge of the section as repair contractor.

The contractor has made considerable progress in restoring the section from the effects of the disastrous flood before alluded to, having already according to the estimate of the engineers performed work and furnished materials to the amount of \$10,240 in accordance with old plan, and to the amount of \$5,880 in new protection work, or on change of plan. According to the terms of his contract, the contractor is bound to make such repairs as are in accordance with the plan of the work at the time it was destroyed, to the amount of \$4,000, and one-half the balance at his own expense, and is entitled to be paid by the State the remaining half the said balance, after deducting said \$4,000; and also upon the certificate of the division engineer such additional cost of any structures or works as may be occasioned by a change from the original plan.

Upon these principles and upon the estimates and such certificate of the engineer, a draft has been given to the contractor for work since said freshet for the sum of \$9,000.

The superintendent's reports show the following to have been the depth in feet of the water upon the sections at the points, and at the times of the measurement in the months stated, up to the time of the freshet, at

	May.	June.	July.	Aug.	Sep.
	ft. in.	ft. in.	ft. in.	ft. in.	
Brushville.....	4 6	4 0	4 4	4 6	....
Nunda.....	4 6	4 0	4 6	4 0	....
Lock No. 60 above.....	4 6	4 6	4 6	4 6	....
Portage.....	4 4	4 0	4 4	4 4	....
Lock No. 61 below.....	4 4	4 4	4 6	4 6	....
Fillmore.....	4 6	4 0	4 6	4 8	....
Burville.....	4 6	4 0	4 4	4 0	....
Caneadea level.....	4 6	4 6	4 6	4 6	....

The following detentions to navigation have occurred upon this section.

On the 10th and succeeding days of June, a detention of four and a half days, occasioned by the breaking of the gates of lock No. 53.

On the 16th and succeeding days of June, a detention of two and a half days, occasioned by a break in the embankment at the head of the Mixville aqueduct.

In the month of July, a detention of thirty hours caused by a slide in the high embankment at Portage.

The following repairs have been made upon the section in the season last past, as reported by the superintendent.

Removal of deposits from the channel, and other repairs preparatory to opening of navigation in the spring, to the amount of \$3,200, according to the accounts of the contractor.

Two new lock gates have been made and several others repaired.

Seventeen bridges have been raised to make more room for passage of boats, and to some of which new bents have been added, and other bridges have been thoroughly repaired.

Towing-path and berm banks have been raised and repaired.

Payments for repairs on this section, for the year 1861, have been as follows :

To Myron Bangs, repair contractor

for balance of his annual compensation, by draft,.....

\$4,054 16

To George D. Lord, assignee of John

Lambert, on his annual compensation, by draft,.....

7,994 25

\$12,048 41

To paid on estimate of Engineer's and certificate of division engineer, on account of the portions of the repairs to be paid by the State, in restoring the section and its structures from the destruction caused by the flood of September last.....	\$9,000 00	
		\$21,048 41
Miscellaneous payments, to wit:		
To paid Myron Bangs, former contractor, for tools purchased of him, and sold to present contractor,...	\$460 00	
To other miscellaneous payments,--	5 00	465 00
Total cost of repairs on this section for 1861,--	\$21,513 41	

REPAIR SECTION No. 3.

This section is in charge of Alonzo Hawley, as superintendent of repairs. The section is thirty-eight miles long, and extends from the south bank of the Genesee river, at Oramel, below and including lock 72, to the Allegany river, at Millgrove pond. The extension of the Genesee Valley canal was added to the section by a resolution of the Canal Board, on the 1st day of June, 1860.

The following mechanical structures are upon the section :

- 34 locks,
- 1 guard-lock,
- 4 aqueducts,
- 15 waste weirs,
- 23 culverts,
- 37 road bridges,
- 14 farm bridges,
- 1 tow-path bridge,
- 2 road and change bridges,
- 1 foot bridge,
- 5 lock houses,
- 1 overfall, at Rockville reservoir,
- 2 feeder dams,

Superintendent Hawley reports the following to be the depth of water upon the section, at the points and times stated :

	May.	June.	July.	Aug.
	ft. in.	ft. in.	ft. in.	ft. in.
Lock No. 72.....	4 1	4 0	4 0	4 0
do 73.....	4 3	3 3	4 2	4 6
do 74.....	4 5	3 9	4 0	4 4
do 75.....	4 4	4 0	4 2	4 1
do 76.....	4 4	4 3	4 4	4 4
do 77.....	4 4	4 3	4 3	4 5
do 78.....	4 4	4 3	4 3	4 6
do 79.....	4 4	3 0	4 3	4 5
do 80.....	4 5	4 3	4 3	4 5
do 81.....	4 3	4 1	4 3	4 4
do 82.....	4 1	4 0	4 2	4 2
do 83.....	4 4	4 1	4 4	4 4
do 84.....	4 2	4 0	3 11	3 7
do 85.....	4 2	3 9	4 0	4 3
do 86.....	4 3	3 10	4 0	4 3
do 87.....	4 4	4 0	4 0	4 4
do 88.....	4 3	3 9	4 3	4 5
do 89.....	4 5	4 0	4 1	4 3
do 90.....	5 3	4 4	3 11	4 5
do 91.....	5 3	4 1	4 0	4 3
do 92.....	4 3	4 1	3 11	4 3
do 93.....	4 4	4 0	3 8	4 0
do 94.....	4 3	4 1	4 1	4 4
do 95.....	4 5	4 6	4 2	4 6
do 96.....	4 4	3 0	4 4	4 3
do 97.....	4 3	4 1	4 2	4 3
do 98.....	4 2	4 2	4 2	4 4
do 99.....	4 1	4 0	4 0	4 0
do 100.....	4 3	4 2	4 6	4 4
do 101.....	4 2	4 0	4 3	4 3
do 102.....	4 0	4 1	4 3	4 4
Smith's Mills feeder bar.....	.....	3 10	3 10	3 11
Olean aqueduct.....	4 2	3 8	4 0	4 1
New do.....	4 2	4 1	4 2	4 0
Extension road bridge, Weston's Mill.....	4 6	4 4	4 2	4 3
Guard-lock, Oswayo creek.....	4 4	4 2	4 0	4 0

The following extract from the report of Superintendent Hawley, gives a very full and perfect account of the condition of the section for the last season: "A very destructive ice flood which occurred in the month of March, broke the canal bank in four places; washed around the backing of lock 97; carried away a waste weir at Rockville, and a tow-path bridge at lock 87; damaged the waste weir at Black creek; carried heavy bars into the prism of the canal; washed away portions of the tow-path, and caused extensive damage to Smith's mills feeder dam, all of which was repaired before the first of May, excepting the Smith's mills feeder dam, and the waste weir at Black creek.

"In the month of April, a small portion of the section was "bottomed out;" numerous bars were removed, several lock gates were repaired, and the canal put in fair condition for navigation, except the bottoming out which has been too much neglected for several years, making it necessary to raise the water in many of

the levels, above the flow line, in order to procure good navigation.

"Three breaches occurred during the season of navigation, prior to the 28th of September; one in May, and two in July, causing a suspension of navigation on portions of the section for three days.

The water was all drawn out of the Cuba reservoir on the 22d day of September, but navigation was continued (with difficulty for want of water), until the 28th of September; when an unprecedented flood caused such extensive damage to the canal, that there is no prospect that navigation can be resumed during the season.

"The flood caused a heavy break in the canal bank at Oramel; a break in the Rockville reservoir dam, carrying away about 6,000 yards of embankment; a break in canal bank below lock 97; three breaks on the five mile level between Hinsdale and Olean, and a break at Weston's mills on the Genesee Valley canal extension.

"A tow path bridge, a portion of tow path and protection wall, two large waste weirs, and the earth from the backing of three locks (Nos. 87, 88 and 89), at Rockville, all carried away, and a large amount of gravel deposited in the prism of the canal. It also caused extensive damage to the tow path, all along the line, and large deposits of gravel from the creek and rivulets which discharge into the canal.

"The Ischua feeder, and feeder dam, are also considerably damaged."

Payments for repairs on this section for the year 1861, have been as follows:

To the repair contractor for his annual

compensation, by draft..... \$7,432 95

To same, for extra work, certified by
division engineer, under repair con-
tract, to wit:

For work and materials to pro-

tect canal bank at Crawford

creek \$884 25

For work and materials to pro-

tect banks at the culvert in

Belfast, and to turn the

creek into the culvert..... 276 92

[Assem. No. 9.]

10

For work and materials to prevent damage, in case of high water, when repairing Rockville reservoir.....	\$201 26	
	<hr/>	\$1,362 43
For work and materials on account of changes of plan, and improvements to protect the bank of the canal from the wash of Black creek, below lock 82 and the bank of the canal, and guard bank below lock 87, from the wash of the flood waters of Rockville reservoir	2,063 04	
	<hr/>	\$12,033 73
Miscellaneous payments, to wit:		
For removal of dam in the canal at Olean	\$157 50	
For removal of dam in the canal at Olean	95 85	
For lumber.....	5 65	
For attorney's fees, attending suit against Superintendent	25 00	
	<hr/>	284 00
Total cost of repairs on this section for 1861.		<hr/> <u>\$12,317 73</u>

H. GARDNER,

Canal Commissioner Western Division.

Dec. 31st, 1861.

REPORT OF T. C. RUGGLES,
UNDER ACT CHAPTER 495, LAWS OF 1859.

By virtue of section 9 of act chapter 495, Laws of 1859, Mr. T. C. Ruggles, civil engineer, was appointed to make two trips from Buffalo to Albany with a boat drawing "four inches more water than other boats are permitted to draw," and to report the obstructions, measureances, &c., to the Auditor. His last report is herewith submitted :

SEPTEMBER, 1861.

Hon. N. S. BENTON, *Auditor Canal Department* :

Dear Sir—Agreeable to instructions from honorable Benjamin F. Bruce, Canal Commissioner, I have made a survey of the Erie canal from Buffalo to Albany. This survey is made in accordance with a law passed in 1859, requiring the Canal Commissioners to have a monthly survey made of the condition of the canals, and to have all obstacles to navigation reported to the Auditor of the Canal Department. The law requires the test boat used on these trial trips to draw four inches more than other boats are permitted to draw. That it shall run through the whole length of the canal on which the trip is made, day and night, and a statement of all delays occasioned by obstacles in the navigation ; want of water, and the causes thereof, monthly published in the State paper.

I am also requested, by Canal Commissioner Bruce, to make such " suggestions and observations as I may deem of importance to the interest and navigation of the canal." The name of the boat used on this trial trip was the Amanda, John Mitchell captain. It belonged to the Western Transportation Company, John Allen, Jr., president, Samuel Morgan, vice-president. These gentlemen offered their boat for this trip. The draught of water was 5 feet 10 inches, four more inches than other boats are allowed to draw. The boat was perfectly trimmed and carefully measured in Buffalo by inspector B. A. Crane :

	lbs.	lbs.
The weight of boat and cargo, to test the different weigh-locks, was at Syracuse weigh-lock.....	540,700	540,700
At Rochester the weight exceeded that of the Syracuse weigh-lock, there being more water in the boat.....	1,775	542,475
At Utica the weight exceeded the Syracuse for same cause—more water	1,500	542,200
At West Troy the weight was less than at Syracuse, there being less water in the boat..	900	539,800
Water in boat at Syracuse 1.9-16 inches, at Rochester 1.13-16, at Utica 1.15-16, at West Troy 1.1-16.		

A barrel of copper ore, weighing 700 lbs., was rolled off, and on the boat at the different weigh-locks, and weighed the same at all excepting the Utica weigh-lock, which does not weigh less than 100 lbs.

The different depths of water in the different levels were ascertained as before, by an instrument attached to the right-hand side of the boat that sounded continuously all the way from Buffalo to Albany. A book of these soundings of 102 pages accompanies this report, and gives full information of the depth of water in the different levels, over aqueducts, and on the mitre sills of the locks; also all detentions and delays from *running aground, detention at locks, at stations, and miscellaneous delays.*

Detentions from grounding were as follows:

	h.	m.
About 100 feet east of bridge at Hulburton, boat run on a rock, detained.....	0	30
Detained about half a mile below Hulburton, 400 feet west of a bridge—at the same place the Millennium grounded. Mr. L. M. Loss, the contractor, was obliged to raise the stop-gate at Holley, as before.....	6	41
Detained 1½ miles west of Lockpit—same place the Millennium grounded.....	2	10
Detained 100 feet east of bridge near elevator east of Weedsport	0	20
Aground 1½ miles west of Canton, by a feeder on berme side of canal.....	7	25
Aground at Stacey's basin.....	0	40
Aground west end of crescent at John White's; also aground opposite brickyard east of John White's....	0	40
	18	26
Detention at locks—(average locking 27 minutes).....	31	36
Detention at stations—(average detention 26 minutes).....	12	41
Miscellaneous delays.....	7	35
	70	18

All these delays might be avoided, except the detention at the locks. The average time for locking was 27 minutes. Ten lockings were made in ten minutes, and five in five minutes.

I believe that with more men night and day, more lights, pulleys and places to fasten them, that the average time of locking might be reduced to fifteen minutes.

Low soundings between $5\frac{3}{10}$ ft and $6\frac{3}{10}$ ft, were at the following points.

	Fath.	Feet.
About three-fifths of a mile east of Black Rock lock.....	6	3
Two and a half miles west of change bridge, west of Tonawanda, some soundings.....	5	9
..... and	6	4
Within 3 miles of Lockport, between dredge and bridge.....	5	8
A little west of Middleport.....	6	1
Entering Medina, near warehouse.....	6	2
Three-fourths of a mile east of Medina aqueduct.....	6	1
Three-fifths of a mile east of Eagle harbor, a little west of a dam projecting $\frac{1}{2}$ of the way across the canal.....	6	2
One and a half miles east of Eagle harbor.....	6	2
One and a half miles east of Albion, near stone quarry.....	6	2
Three miles east hit a rock.....	5	6
Five miles east of Albion.....	6	2
Passing through Hulburton, east of bridge, hit a rock..	5	8
Leaving Hulburton about $\frac{1}{2}$ of a mile, hit 3 rocks, or hard bottom.....	5	8
One-eighth farther, hard bottom.....	5	8
About four-fifths of a mile east of Hulburton, near a b'dge	5	8
One and a half miles east.....	6	2
At a point near old canal leading to Holley.....	6	2
Three-fourths of a mile east of stop gate, near Holley..	6	2
Near stone quarry, $1\frac{1}{2}$ m. west of Brockport, stone in canal	6	2
About one-fifth of a mile west of Cooley's basin.....	6	2
About $\frac{1}{4}$ of a mile east of Cooley's basin.....	6	2
About $\frac{1}{2}$ a mile east of Cooley's basin.....	6	6
..... and	6	2
Through part of a cut after leaving Cooley's basin.....	6	1
..... and	6	3
East of cut $\frac{1}{2}$ a mile.....	6	3
East of Adams' basin $\frac{1}{2}$ a mile.....	6	6
..... and	6	2
East of Adams' basin 2 miles, near Spencerport.....	6	2

	Feet.	In.
Between locks 62 and 63	6	0
and	6	2
Two miles east of Fairport	6	2
Leaving Waynesport.	6	2
Between Waynesport and Macedon.	6	0
and	6	3
Little west of Port Gibson	6	2
Leaving Port Gibson.	6	3
Little west of Newark.	6	1
One and a half miles east of Lyons.	5	8
And low soundings for $\frac{1}{2}$ mile.	6	2
Leaving lock, No. 53.	6	3
Near E. B. Kellogg's.	6	2
Through Clyde, some soundings.	6	2
East of railroad bridge after leaving Clyde.	6	3
One and a half miles west of Lockpit.	5	9
Near Lockpit, east and west.	5	9
and	6	2
Near Montezuma, little east, one sounding.	6	2
About 1 mile east of Cayuga aqueduct.	6	2
Half a mile east of Port Byron.	6	2
Near a waste weir.	6	1
Near Centreport, east and west	6	2
and	6	3
Westport, opposite Spring Grocery.	6	2
Between Weedsport and lock, No. 51, many soundings.	6	0
and	6	3
Leaving lock No. 51, Jordan lock.	6	2
Between lock No. 51, and Canton, many soundings.	6	2
and	6	3
Leaving Canton for 3 miles, $\frac{1}{4}$ of the soundings on one side of the boat were.	6	3
Other side.	6	8
and	7	0
Leaving lock No. 47, out of Syracuse, a few soundings.	6	1
Two and a half miles east of Syracuse.	6	1
and	6	3
Leaving Orville feeder.	6	2
Leaving Manlius, many soundings.	6	2
East of Chittenango landing in a cut, many soundings.	6	1

	Feet.	In.
Between Lenox basin and a feeder on berme side of canal.....	6	2
A little west of Loomis' bridge, $1\frac{1}{2}$ miles from Dunbar- ton.....	6	2
Stacey's basin, aground.....	5	8
Soundings between bridges.....	6	0
and.....	6	4
A few soundings near Higginsville.....	6	2
Entering Rome, west end of railroad warehouse.....	6	2
Near railroad bridge.....	6	2
About $1\frac{1}{2}$ miles from Stanwix station, near small white house on tow-path, and wood colored house or berme.....	6	2
Opposite Henesee's basin hit two stones.....	5	8
Leaving Henesee's, near open culvert.....	6	2
Three-quarters of a mile from Henesee's.....	6	2
and.....	5	9
One hundred feet east of county line bridge, between Herkimer and Oneida, struck a stone.....	5	9
Within $\frac{1}{2}$ a mile of Frankfort lock, two soundings.....	6	3
Within 200 feet of McGowan's bridge, and at bridge...	6	2
Near Myer's storehouse.....	6	2
Leaving Mohawk, under wire bridge.....	6	2
Leaving lock No. 36, in one-fifth of a mile, a few sound- ings.....	6	2
Hit three rocks.....	5	9
Leaving lock No. 33, a few soundings.....	6.1	6.2
Leaving lock No. 33, about 2 miles, in a rock cut, one sounding.....	6	3
Within 100 feet of a bridge, near and west of Port Plain, hit a stone.....	6	1
Leaving lock No. 32, near white fence or berme.....	6	2
Near Big Nose, west of Prince's aqueduct, one sounding.	6	1
Some of the soundings were 6 feet 1 inch on berme side, and 6 feet 8 inches on tow-path side.		
Fultonville, one sounding.....	6	2
One and a quarter miles from French's station, a few soundings.....	6.0	6.2
Hit a stone near middle of canal leaving bridge.....	5	8
East of San Sai Kill aqueduct, near James Cline's bridge.....	6	1

	Feet.	In.
In cut before reaching upper aqueduct	6	1
and	6	8
Little west of lock No. 20, middle of canal, 7 feet side		
of boat 6.2-10	7	0
and	6	2
Near rock cut through narrows	6	0
and	6	7
Opposite John White's in crescent	5	9
Opposite brickyard, near John White's	5	8
One-third of a mile below lower aqueduct, below where		
dredge has been	6	1
and	6	2

The following table gives total length of feet touched by sounding instrument. They are arrayed in three columns. The distance was ascertained by timing the different teams. By this method the distance they walked was found to average 150 feet per minute. On some of the routes the horses walked but 120 feet, on others 200 feet per minute. The distances were carefully noted.

WESTERN DIVISION.

	Depth of Water.		
	5 $\frac{2}{10}$ to 6 $\frac{2}{10}$	6 $\frac{2}{10}$ to 6 7	6 7 to 7
Between Buffalo and Lockport	170	445	163,065
There are probably more of the middle depths of water on this route than noted. We kept in the deepest water. All this work will be finished by next spring.			
Between Lockport and Medina	300	12,732	82,008
Medina to Brockport	12,090	66,360	48,270
Brockport to Spencerport	7,330	19,510	15,070
Spencerport to Rochester		1,100	62,080
Rochester to Macedon	3,820	16,120	100,750
Macedon to junction of Western and			
Middle Division near Montezuma ..	16,000	67,150	86,500
	39,710	183,417	557,743
	or	or	or
	7 $\frac{5}{10}$	34 $\frac{7}{10}$	105 $\frac{5}{10}$
	miles.	miles.	miles.

MIDDLE DIVISION.

	Depth of Water.		
	5.8 to 6.3	6.3 to 6.7	6.7 to 7.
Junction of Western and Middle Divisions to Weedsport	8,430	18,090	47,800
Weedsport to Canton	15,415	29,000	9,700
Canton to Syracuse, middle of canal generally $6\frac{2}{10}$ to 7	5,010	12,800	56,210
Syracuse to Kirkville	6,110	32,200	21,200
Kirkville to Canastota	2,210	23,290	26,730
Canastota to Higginsville	2,440	5,100	44,860
	39,615	120,480	206,500
	or	or	or
	$7\frac{1}{2}$	$22\frac{2}{10}$	$39\frac{1}{10}$
	miles.	miles.	miles.

EASTERN DIVISION.

	5.8 to 6.3	6.3 to 6.6	6.7 to 7.
Higginsville to Stanwix station one mile east of Rome	3,100	20,100	34,240
Stanwix station to Utica	800	12,080	60,400
Utica to Mohawk	2,720	14,680	61,800
Mohawk to Cold Spring	1,120	9,100	74,260
Cold Spring to Fultonville	2,970	18,270	94,740
Fultonville to Schenectady	4,470	11,793	121,367
Schenectady to West Troy. Some soundings on side of boat 6.3, in middle of canal 7.0	6,000	33,450	81,840
	21,180	121,473	528,647
	or	or	or
	4 miles.	23 mi's.	100 mi's.

If the water over mitre sills and aqueducts were to the required height for a seven foot canal, the proportions in the 1st and 2d columns 5.8 to 6.3 and 6.3 to 6.7, would be reduced ; this might be tried in the next trip.

Depth of water in levels over mitre sills and aqueducts:

Mitre sill at Black Rock lock, 10 9-10 feet; at Lockport, lock 71, $14\frac{1}{2}$ feet; mitre sill at lock 67, Lockport, 6 1-10 feet; Medina aqueduct, 6 6-10 and 6 8-10; Rochester aqueduct, 6 7-10 and 6 8-10; lock 66, mitre sill 7 feet; lock 65, 7 5-10; lock 64, 6 8-10;

lock 63, 6 8-10; lock 62, 7 3-10; lock 61, 7 3-10; lock 60, 6 6-10; lock 59, 7 4-10; lock 58, 7; lock 57, 7; lock 56, 7.2; lock 55, 6.5; lock 54, 7; lock 53, 6.6; Cayuga aqueduct, 6 3-10; lock 52, 6 8-10 and 11 8-10; aqueduct 6 3-10; lock 51, lower mitre, 7, upper mitre, 7 4-10; Jordan aqueduct, 6 8-10; nine mile creek aqueduct 7.1; lock 50, upper mitre, 8 9-10, lower mitre, 6 9-10; lock 49, 7; lock 48, 7-3; lock 47, upper mitre, 6.7 or 7, lower mitre, sill, 10.5; Orville feeder, 6.75; Chittenango aqueduct, 6.9; Bull's aqueduct, 6.6; Oriskany aqueduct, 6.9; lock 46, upper mitre, 7.6, lower mitre, 7.3; Ferguson's aqueduct, 7 8-10; lock 45, 6.8; lock 44, 6.9, lock 43, 7.7; lock 42, 7.1; lock 41, 7 4-10; lock 40, 8.1; lock 39, 7.4; lock 38, 8.2; lock 37, 7; lock 36, 6.8; lock 35, 6.9; lock 34, 7 7-10; lock 33, mitre sill, 6 5-10; lock 32, 7 or 6 2-10; lock 31, 6.4; aqueduct, 6 6-10; aqueduct, 6.6-10; Prince's aqueduct, 6.5-10; Schoharie aqueduct, 6 7-10; lock 30, 7.4-10, back swells; lock 29, 7.4-10; lock 28, 6.9-10; lock 27, 7.3-10; lock 26, 6 2-10; mitre sill raised; lock 25, 6.5; lock 24, 6.5; lock 23, 6.1; aqueduct, 6.8; lock 22, 6.8; lock 21, 7; lock 20, 6.4; lock 19, 6.5; aqueduct, 6.7; lock 18, 6.6; lock 17, 7; lock 16, 8; lock 15, 7.2; lock 14, 7.8; lock 13, 7.6; lock 12, 7.5; lock 11, 7.6; lock 10, 7.2; lock 9, 7.6; lock 8, 7; lock 7, 7.6; lock 6, 7; lock 5, 7.2; lock 4, 7-6; lock 3, 7.4; lock 2, 7.6; lock 1, 9 6-10; river low, West Troy. In measuring mitre sills the back swells on short levels affected the depth of water. At night it was difficult to measure correctly, if windy or stormy, on account of the current of air passing through the locks making it difficult to keep our lanterns lighted.

The soundings were mostly to the right hand of the centre of the canal, as before mentioned, the same side a boat is required by law to go.

If the cross section of the canal was 7 feet deep for a width of $52\frac{1}{2}$ feet at bottom, a boat, from its constantly meeting others, would naturally keep to the right of the centre. At present, as in many places, the deepest water is in the middle of the canal; a loaded boat going to Albany is often obliged to crowd the boat it meets on the tow-path.

Some of the lock houses are a good deal out of repair, and uncomfortable in stormy weather for the lock tenders. Mr. Seely, on his section near Syracuse, has very comfortable new lock houses, judging from appearances he takes great pride in his work. The Canal Commissioners, in 1857, suggested that at some of the locks buildings be erected that would accommodate the collector.

and lock tenders. The captain of a canal boat, when near a collector's office, has now to stop his boat before reaching the locks.

Either the tow-path or berme is low at the following points: about $1\frac{1}{2}$ miles east of Black Rock lock; leaving lock No. 59; leaving lock No. 58 in about one-fourth of mile; leaving lock No. 54 one-half a mile; little west of lock No. 52; near lock No. 40; near lock No. 37; near lock No. 28.

Being occupied taking depth of water over mitre sills there was no opportunity to note the lock gates that leaked.

I mentioned in my last report of canal boats being coupled together on the Morris canal and suggested their being on this, so they could carry nearly a double amount of freight, and have only one bow, and that sharp to pass through the water; the stern would also be sharp. The captain of the *Amanda*, Mr. John Mitchell, informed me he once had charge of three canal boats from New York to Buffalo, he tied them together, had four men to assist in navigating the canal, and four horses for towing.

Section boats would not increase the capacity of the canal; but it was my impression they would lessen the cost of transportation. Any change made in the future to increase the capacity of the canal must be made at the locks, as suggested by the Hon. E. S. Prosser of Buffalo; they limit its capacity for tonnage, delay the boats, and incidentally affect the price of transportation. The amount of tonnage depending on the number of boats that can be daily locked.

These surveys of the canal with a test boat call constant attention to any irregularities in the bottom, that may exist on sections where earth is now constantly washing in. These can then be removed before causing injury or detention to boats navigating the canal. This information now comes from boats being delayed at some bar, by low water, or by running on some rock in the canal; all which causes can be removed by the Commissioner's having reliable information beforehand.

After the canal is finished to seven feet in depth, with a uniform width at bottom of $52\frac{1}{2}$ feet, a test boat drawing 6 ft. 10 in. passed through the canal monthly, will keep the Erie a seven foot canal.

However good the intentions of the contractors, the canal will fill up by degrees, as other canals do, if a boat is not constantly passed through it, within an inch or two of the bottom. Superin-

tendent Drake and contractor Dodge accompanied us over their sections on the western division. Superintendents Beardsley and Dorn were prompt and efficient as in the former trips. Mr. McCleary contractor, accompanied us over his section.

In conclusion, as regards the "advancement of the interests and navigation of the canal," I will make a few observations as requested by Canal Commissioner Bruce.

The result of my observations after making three careful trips, two under direction of Hon. Hiram Gardner, Canal Commissioner western division, and the third, the present trip, are :

1st. I think the canal should be kept evenly excavated to a uniform width at bottom of $52\frac{1}{2}$ feet, so a boat drawing 6 ft. 5 in, (test boat 6 ft. 10 in.) can keep on the right hand side of the centre of the canal all the way from Buffalo to Albany, without the risk of running aground, or having collisions with other boats, which now often occur, from being obliged to keep in the centre of the canal.

2d. That three horses should be used instead of two, the constant pull now required is too great a strain for two horses, they are never rested, and soon worn out.

Three horses, with care, would be always ready, tow faster, and last longer.

The third horse would make a difference of about a quarter of a mile an hour, for boats drawing 6 feet, and shorten the trip a day between Buffalo and Albany.

3d. The time now lost in delays and detentions is about as follows :

	Hours.	Minutes.
Delay from running aground.....	18	26
Delay at locks (average locking 27 minutes).....	31	36
Delay waiting for teams (average delay 26 minutes)	12	41
Delay from not using 3 horses—I estimate towing a boat drawing 6 feet, with two horses, the same as a delay of $\frac{1}{4}$ of a mile per hour, or from Buffalo to Albany of 24 hours.....	24	00
Delays miscellaneous.....	7	35
	<hr/> 94	<hr/> 18
I estimate all the above except the locking and mis- cellaneous delays can be avoided, and they can be reduced to 24 hours.....	24	00
	<hr/> 70	<hr/> 18
Total delays, 70 hours 18 minutes, or three days	70	18

4th. Sharper bows and sterns for boats drawing 6 ft 5 in.

5th. If a daily report is made to the Canal Commissioners at 3 P. M., serious obstacles can be attended to before night comes on, and preparations made to remove others early next morning.

I respectfully call your attention to the depths of water between $5\frac{3}{10}$ and $6\frac{3}{10}$ feet in book of soundings; to delays in canal navigation: depths of water on mitre sills and aqueducts; low banks; weight of boat and cargo, at the different weigh locks; also, to the advantage of having continuous soundings to ascertain depth of water, instead of using rods, which give the depth only once in a 100 or 200 feet, skipping over intervening points.

Respectfully submitted,

THOS. COLDEN RUGGLES,

Civil Engineer.

TABLES
ACCOMPANYING THE ANNUAL REPORT OF THE
CANAL COMMISSIONERS.

CANAL COMMISSIONERS.

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1846	371,185	843	53,546	1,409	12,325	560	14,264	385
1847	380,388	864	39,551	1,040	14,192	645	15,917	430
1848	503,953	1,145	72,783	2,021	13,009	591	27,232	736
1849	395,681	899	32,792	863	11,824	537	24,306	657
1850	478,887	1,085	31,805	837	10,831	492	33,230	852
1851	437,458	972	31,045	817	20,576	895	37,741	968
1852	558,329	1,232	42,728	1,124	27,606	1,200	32,620	836
1853	575,777	1,271	38,026	1,000	17,421	680	24,366	625
1854	677,270	1,543	86,529	2,277	17,025	680	30,653	786
1855	505,608	1,154	59,192	1,558	12,880	560	22,853	560
1856	454,865	1,031	59,824	1,574	9,864	448	17,209	441
1857	458,742	1,035	78,017	2,053	13,234	575	87,314	2,238
1858	435,916	973	107,698	2,834	21,769	946	105,605	3,862
1859	446,746	999	48,253	1,269	5,850	234	21,965	563
1860	229,008	526	15,639	412	3,492	159	12,431	319
1861	206,952	476	25,552	672	19,284	876	23,455	601

[Assem. No. 9.]

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Statement of Superintendent's expenditure.—Continued.

YEAR.	Crooked Lake canal.		Chenango canal.		Genesee Valley canal.		Oncida Lake canal.	
	Cost of repairs.	Average per mile.	Cost of repairs.	Average per mile.	Cost of repairs.	Average per mile.	Cost of repairs.	Average per mile.
1827	---	---	---	---	---	---	---	---
1828	---	---	---	---	---	---	---	---
1829	---	---	---	---	---	---	---	---
1830	---	---	---	---	---	---	---	---
1831	---	---	---	---	---	---	---	---
1832	---	---	---	---	---	---	---	---
1833	---	---	---	---	---	---	---	---
1834	\$2,653	\$331	---	---	---	---	---	---
1835	3,556	454	---	---	---	---	---	---
1836	4,739	592	---	---	---	---	---	---
1837	6,214	776	\$19,508	\$201	---	---	---	---
1838	4,454	556	10,809	214	---	---	---	---
1839	3,557	443	17,248	177	---	---	---	---
1840	4,501	562	15,427	159	\$4,529	\$125	---	---
1841	9,034	1,129	15,563	160	10,460	290	\$3,370	\$561
1842	8,113	1,014	18,955	195	17,749	341	3,608	601
1843	4,047	505	15,062	155	15,210	292	2,232	372
1844	3,951	493	15,959	164	15,556	299	1,696	272
1845	4,765	595	18,951	195	16,901	325	1,933	322
1846	5,309	663	18,452	190	17,399	334	17,875	2,272

CANAL COMMISSIONERS.

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1847	5,890	736	18,859	194	15,782	303	5,842	973
1848	8,516	1,064	20,901	215	26,577	510	1,855	809
1849	10,296	1,287	25,888	267	18,183	350	1,160	360
1850	5,629	705	27,189	280	18,575	357	4,892	815
1851	5,319	665	29,822	307	32,938	383	3,591	449
1852	7,751	969	36,730	375	79,587	904	6,360	1,060
1853	4,932	616	38,243	394	55,766	634	6,166	770
1854	5,132	641	49,232	507	48,093	546	10,440	1,740
1855	4,316	539	49,187	486	49,000	415	6,236	1,039
1856	3,647	456	13,903	143	34,271	381	2,589	432
1857	4,447	556	27,826	265	60,650	514	3,119	519
1858	9,803	1,225	44,114	455	80,911	686	4,104	586
1859	4,849	606	26,068	269	46,490	394	3,975	568
1860	4,598	575	26,934	278	38,518	304	4,059	676
1861	6,186	773	22,594	233	28,450	224	3,242	540

Statement of Superintendent's expenditure.—Continued.

YEAR.	Black River canal.		Oneida River improvement.		Total miles.	Total cost of repairs.	Total average per mile.
	Cost of repairs.	Average per mile.	Cost of repairs.	Average per mile.			
1827	—	—	—	—	400	\$232,473	\$528
1828	—	—	—	—	478	234,433	490
1829	—	—	—	—	500	254,433	509
1830	—	—	—	—	500	221,005	442
1831	—	—	—	—	500	180,773	361
1832	—	—	—	—	500	344,917	690
1833	—	—	—	—	537	372,789	694
1834	—	—	—	—	545	478,964	879
1835	—	—	—	—	545	432,115	793
1836	—	—	—	—	545	406,122	745
1837	—	—	—	—	642	492,144	766
1838	—	—	—	—	642	481,774	750
1839	—	—	—	—	642	379,769	591
1840	—	—	—	—	694	460,686	664
1841	—	—	—	—	700	357,828	511
1842	—	—	—	—	700	452,559	646
1843	—	—	—	—	700	383,076	547
1844	—	—	—	—	700	464,329	663
1845	—	—	—	—	700	520,452	743
1846	—	—	—	—	700	510,355	729

1847	-----	-----	-----	-----	-----	700	496,424	709
1848	-----	-----	-----	-----	-----	700	674,777	964
1849	-----	-----	-----	-----	-----	700	521,122	744
1850	-----	-----	-----	-----	-----	762	626,950	823
1851	-----	-----	-----	-----	-----	817	722,259	762
1852	-----	-----	-----	-----	-----	887	824,533	929
1853	-----	-----	-----	-----	-----	887	789,082	901
1854	-----	-----	-----	-----	-----	887	960,265	1,082
1855	-----	-----	-----	-----	-----	901	781,688	868
1856	-----	-----	-----	-----	-----	901	616,014	684
1857	-----	-----	-----	-----	-----	909	752,575	828
1858	-----	-----	-----	-----	-----	917	878,721	958
1858	-----	-----	-----	-----	-----	917	630,615	688
1860	-----	-----	-----	-----	-----	866	356,966	412
1861	-----	-----	-----	-----	-----	878	360,187	410

SCHEDULE

Of Contracts let by Board of Canal Commissioners under acts, chaps. 327, Laws of 1854, and 554 of 1855, showing the commencement of the several terms, the canal or section embraced in the contract, the duration of each term, and the annual compensation to the contractors.

Commencement of term.	Canal and section.	Duration of term.	Annual compensation	Remarks.
Oct. 1, 1854..	Section 8, Erie canal.....	5 years	\$7,370	Expired October 1, 1859
March 1, 1855..	Section 1, Erie canal.....	5 years	43,000	Expired March 4, 1860
Oct. 1, 1855..	Section 1, Chenango canal.....	5 years	14,700	Expired October 1, 1860
Oct. 1, 1855..	Section 2, Chenango canal.....	5 years	6,000	Expired October 1, 1860
Oct. 1, 1855..	Oneida Lake canal.....	5 years	3,975	Expired October 1, 1860
Oct. 1, 1855..	Crooked Lake canal.....	5 years	4,473	Expired October 1, 1860
Jan. 1, 1856..	Section 1, Black River canal.....	5 years	3,999	Expired January 1, 1861
Jan. 1, 1856..	Section 2, Black River canal.....	5 years	9,985	Expired January 1, 1861
Apr. 15, 1858..	Addition to sec. 2, Black River canal. See chap. 185, Laws of 1858.....	-----	2,000	Expired January 1, 1861
Feb. 1, 1856..	Section 2, Genesee Valley canal.....	5 years	13,900	Expired Febru'y 1, 1861

The following is a Schedule of all Repair Contracts let in pursuance of act, chap. 105, Laws of 1857, to the present time, and shows the commencement of the several terms, the canal or section embraced in the contract, the duration of each term, the annual compensation to the contractor, and the several amounts of cash deposits as security for the performance of the contracts:

Commencement of term.	Canal and section.	Duration of term.	Annual compensation.	Cash security.	Remarks.
Feb. 1, 1859.....	Oswego, section 2.....	3 years.....	\$12,899	.....
Feb. 1, 1859.....	Chemung and feeder.....	do.....	13,475	.....	Abandoned March 5, 1861.
Feb. 1, 1859.....	Chemung, section 3.....	do.....	4,900	.....	do
Feb. 1, 1859.....	Erie, section 9.....	do.....	4,995	.....	do
Feb. 1, 1859.....	Erie, section 7.....	do.....	750	.....	Abandoned February 28, 1861.
April 1, 1859.....	Cayuga and Seneca.....	do.....	3,574	.....	Abandoned March 15, 1861.
May 1, 1859.....	Genesee Valley, section 1.....	do.....	4,800	.....	And 9 cents per cubic yard for excavation; abandoned
May 1, 1859.....	Genesee Valley, section 3.....	do.....	4,889	.....	Abandoned March 8, 1860.
May 1, 1859.....	Erie, section 10.....	do.....	6,190	.....	Abandoned May 1, 1859.
May 1, 1859.....	Erie, section 12.....	do.....	3,453	.....
May 1, 1859.....	Erie, section 13.....	do.....	5,495	.....	Abandoned December 19, 1860.
May 1, 1859.....	Champlain, section 1.....	do.....	8,973	.....	Abandoned April 2, 1860.
May 1, 1859.....	Champlain, section 2.....	do.....	6,800	.....	do
May 1, 1859.....	Champlain, section 3.....	do.....	5,350	.....	do
May 1, 1859.....	Erie, section 2.....	do.....	7,900	.....	Abandoned October 8, 1859.
May 1, 1859.....	Erie, section 3.....	do.....	7,440	.....
May 1, 1859.....	Erie, section 4.....	do.....	8,849	.....
May 1, 1859.....	Erie, section 5.....	do.....	2,995	.....
May 1, 1859.....	Oswego, section 1.....	do.....	2,800	.....	Abandoned August 20, 1859.
Oct. 1, 1859.....	Erie, section 10.....	do.....	7,800	.....	Abandoned October 8, 1859.
Oct. 1, 1859.....	Erie, section 11.....	do.....	8,280	.....
March 1, 1860.....	Erie, section 14.....	do.....	14,500	.....
Oct. 1, 1859.....	Erie, section 8.....	do.....	7,000	.....
Nov. 1, 1859.....	Improvement of Black River.....	5 years.....	3,800	\$2,000	
March 4, 1860.....	Erie, section 1.....	3 years.....	28,440	4,000	
March 4, 1860.....	Erie, section 2.....	do.....	9,700	2,000	
March 4, 1860.....	Erie, section 5.....	do.....	5,890	2,000	
March 4, 1860.....	Erie, section 10.....	do.....	9,430	2,000	
August 1, 1860.....	Champlain, section 1.....	5 years.....	8,559	3,000	

Schedule of Repair contracts.—Continued.

Commencement of term.	Canal and section.	Duration of term.	Annual com- pensation.	Annual com- Cash sec- urity.	Remarks.
August 1, 1860.....	Champlain, section 2.....	5 years	\$9,300	\$2,000	
August 1, 1860.....	Champlain, section 3.....	do	4,300	2,000	
August 1, 1860.....	Genesee Valley, section 3	do	7,433	2,000	
Oct. 1, 1860.....	Onelda Lake and feeder.....	do	2,375	2,060	
Oct. 1, 1860.....	Crooked Lake.....	do	3,869	2,000	
Oct. 1, 1860.....	Chenango, section 1.....	do	11,500	2,000	
Oct. 1, 1860.....	Chenango, section 2.....	do	5,600	2,000	
March 1, 1861.....	Black River, section 2	do	4,178	2,000	
March 15, 1861.....	Erie, section 13.....	do	9,800	4,000	
March 15, 1861.....	Genesee Valley, section 2	do	12,540	3,000	
May 1, 1861.....	Erie, section 7.....	do	3,490	4,000	
May 1, 1861.....	Erie, section 9.....	do	7,000	4,000	
May 1, 1861.....	Black River, section 1	4½ years	8,700	4,000	
May 1, 1861.....	Chenango, section 1.....	5 years	13,990	4,000	
May 1, 1861.....	Chenango, section 3.....	do	7,000	4,000	
June 1, 1861.....	Cayuga and Seneca	4 years	4,490	4,000	Abandoned March 5, 1861.

Rates of toll established by the Canal Board on persons and property transported on the New York State canals, to take effect on the opening of navigation in 1861.

Provisions, &c.

	cts.	m.	fr.
1. On bacon, per 1,000 pounds, per mile.....	0	1	0
2. On lard, lard oil, tallow and grease, per 1,000 pounds per mile.....	0	1	5
3. On salted beef, salted pork, butter, cheese, bran and ship stuffs, oil meal and oil cake, per 1,000 pounds per mile	0	2	0

Iron, minerals, ores, &c.

4. On salt manufactured in this State, gypsum the pro- duct of this State, mineral coal, coal oil, brick and fire brick, soda ash, ice, sand, limestone, clay, earth, manure, pig and smelted copper, iron ore	0	1	0
5. On foreign salt, per 1,000 pounds, per mile.....	0	5	0
6. On foreign gypsum, the product of other States, and barytes, per 1,000 pounds, per mile.....	0	3	0
7. On bloom, scrap and pig iron, iron bolts, broken castings, pot and pearl ashes, calcined plaster, bed plates for steam engines, plow castings and iron safes, per 1,000 pounds, per mile	0	2	0
8. On bar and pig lead, going towards tide water, cop- per ore, leached ashes, bituminous coal, going to- wards and carried to tide water, and charcoal, per 1,000 pounds, per mile	0	0	5
9. On stove pipe and furniture for stoves, not cast iron, per 1,000 pounds, per mile.....	0	6	0
10. On lime and water lime, per 1,000 pounds, per mile	0	1	5
11. On iron car wheels and car axles, stoves and all other iron castings, except machines and the parts thereof, per 1,000 pounds, per mile	0	3	0

Furs, peltry, skins, &c.

12. On furs and skins of animals producing furs, per 1,000 pounds, per mile.....	1	0	0
13. On deer, buffalo and moose skins, per 1,000 pounds, per mile	0	5	0
14. On green hides of domestic animals of the United States, per 1,000 pounds, per mile	0	3	0
15. On imported raw hides of domestic and other ani- mals, per 1,000 miles, per mile	0	3	0

Furniture, &c.

	cts.	m.	fr.
16. On furniture, carriages, sleighs, wagons, cabinet ware, chairs, looking glasses, willow ware and piano fortes, per 1,000 pounds, per mile.....	0	4	0
17. On carts and plows, per 1,000 pounds, per mile.....	0	4	0
18. On mattresses and mechanics tools, per 1,000 pounds per mile	0	2	0

Stone, slate, &c.

19. On tile for roofing, per 1,000 pounds, per mile	0	4	0
20. On fire proof and hydraulic cement, per 1,000 pounds, per mile	0	2	0
21 } 1. On wrought stone, per 1,000 pounds, per mile...	0	1	5
2. On all stone unwrought, or partly wrought, stone for the manufacture of lime, and slate, per 1,000 pounds, per mile.....	0	1	0

Lumber, wood, &c.

Lumber shall not be cleared by measurement when carried in a boat having other articles on board paying toll by *weight*, but such lumber shall, in all such cases, be also cleared by weight.

When a cargo is composed entirely of lumber, which can be cleared by weight or measure, the whole of such cargo shall be cleared by measurement or by weight, as the shipper or master may elect, and in no case shall a portion of any such cargo be cleared by measurement and the other portion by weight.

22. On timber, squared and round, per 100 cubic feet, per mile, if carried in boats.....	0	6	0
23. On the same, if carried in rafts, per 100 cubic feet, per mile	1	0	0
24. On the same, if cleared after the 1st of June, and arriving at tide water before the 15th of August, per 100 cubic feet, per mile.....	0	7	0
25. On lumber, carried in boats, when weighed, per 1,000 pounds, per mile, viz :			
1. On white pine, white wood, cherry, bass wood, cedar, boards, plank, scantling, and all siding, lath and other sawed stuff, less than one inch thick, carried in boats (except such as is enumerated in rates numbers 27 and 38).....	0	2	0
2. On oak, hickory, beech, sycamore, black walnut butternut, maple, ash, elm, fir, tamarack, yew and spruce	0	1	15
3. On hemlock.....	0	0	6
On lumber carried in boats, when not weighed, per 1,000 feet, per mile, viz :			

cts. m. fr.

4. On boards, plank, scantling and sawed timber, reduced to inch measure, and all siding, lath and other sawed stuff, less than one inch thick, (except such as is enumerated in rate number 27) tolls computed on surface measure; and all kinds of red cedar, cedar posts, estimating that a cord, after deducting for openings, will contain 1,000 feet, per 1,000 feet, per mile	0	5	0
5. On hemlock, per 1,000 feet, per mile	0	2	5
6. On sub. 4 and 5, if transported in rafts, per 1,000 feet, per mile	2	5	0
7. On saw dust, per 1,000 pounds, per mile	0	1	0
26. On mahogany (except veneering) reduced to inch measure, per 1,000 feet, per mile	1	5	0
27. On sawed lath of less than ten feet in length, split lath, hoop poles, hand spikes, rowing oars, broom handles, spokes, hubs, tree-nails, felloes, boat knees, plane stocks, pickets for fences, and stuff manufactured or partly manufactured, for boxes, chairs, or bedsteads, hop-poles, brush handles, brush backs, looking glass backs, gun stocks, plow beams, plow handles, per 1,000 pounds per mile	0	2	0
28. On staves and heading, undressed, empty barrels and casks, and ship knees, transported in boats, per 1,000 pounds, per mile	0	1	0
29. On staves and heading, cut, dressed or partly dressed, and stave shooks, bolts and butts	0	1	5
30. On the same, if transported in rafts, per 1,000 pounds, per mile	0	5	0
31. On shingles, carried in boats, per 1,000 pounds, per mile	0	1	5
32. On shingles in boats, per M., per mile	0	0	5
33. On the same, if conveyed in rafts, per M., per mile	0	4	0
34. On split posts, (not exceeding ten feet in length) and rails for fences (not exceeding fourteen feet in length) per M., per mile, carried in boats	2	0	0
35. On the same, if conveyed in rafts, per M., per mile	8	0	0
36. On wood for fuel, (except such as may be used in the manufacture of salt, which shall be exempt from toll) and tanbark, per cord, per mile	0	5	0
37. On the same, if transported in rafts, per cord, per mile	2	0	0
38. On sawed stuff for window blinds, not exceeding one-fourth of an inch in thickness, and window sashes and blinds, per 1,000 pounds, per mile	0	6	0
39. On tanbark, ground, per 1,000 pounds, per mile	0	2	5

Agricultural products, &c.

	cts.	m.	fr.
40. On clover seed, grass seed, and dried fruit, per 1,000 pounds, per mile.....	0	4	0
41. On domestic distilled spirits and hops, per 1,000 pounds per mile.....	0	2	0
42. On wool, domestic cottons and domestic woolens, per 1,000 pounds per mile.....	0	2	0
43. On cotton, per 1,000 pounds, per mile.....	0	1	0
44. On live cattle, sheep, hogs, bones (except for manure) and rags per 1,000 pounds, per mile.....	0	2	0
45. On bones for manure.....	0	1	0
46. On horses (except those used exclusively for towing boats or other floats) per 1,000 pounds, per mile.....	0	3	0
47. On horses used exclusively for towing boats or other floats, exempt from toll.			
48. On barley and junk, per 1,000 pounds, per mile.....	0	3	0
49. On hemp and tobacco, going towards tide water, per 1,000 pounds, per mile.....	0	1	0
50. On tobacco, going from tide water, flax seed, apples and potatoes, per 1,000 pounds, per mile.....	0	2	0
51. On rye and oats per 1,000 pounds, per mile.....	0	2	5
52. On flour, wheat, corn and corn meal, per 1,000 pounds, per mile.....	0	2	5
53. On peas and beans, per 1,000 pounds, per mile.....	0	2	5
54. On onions, turnips, all other esculent roots, pressed hay and pressed straw,, per 1,000 pounds, per mile.....	0	1	0
On all other agricultural productions of the United States, not particularly specified, per 1,000 pounds, per mile.....	0	2	5

Merchandize.

56. On sugar, molasses, coffee, iron in bars, bundles and sheets, steel, boiler iron, nails and spikes, horse shoes, bridge iron and railings, gas and water-pipes, crockery and glass ware, flint enamel ware, tar, turpentine, leather, varnish, iron safes, and all other merchandize not enumerated, per 1,000 pounds, per mile.....	0	2	0
57. On railroad iron and railroad chairs, per 1,000 pounds, per mile.....	0	2	0
58. On threshing, mowing and reaping machines, fanning mills, plows, harrows and drill barrows, powder, gunpowder, demijohns, trees and shrubbery, per 1,000 pounds per mile.....	0	4	0

Articles not enumerated.

	cts.	m.	fr.
59. On all articles not enumerated or excepted, going towards tide water, per 1,000 pounds, per mile..	0	2	5

Boats and passengers.

60. On boats propelled by steam, having preference at the locks over other boats, per mile	4	0	0
61. On boats in tow of such steamboats, not exceeding four, and having such preference, per mile.....	4	0	0
62. On boats, not propelled by steam, or in tow, and having such preference, per mile	4	0	0
63. On boats <i>used chiefly</i> for the transportation of passengers upon <i>all</i> canals, per mile	4	0	0
On the same, if they elect to commute for tolls upon passengers	3	0	0
64. On boats <i>used chiefly</i> for the transportation of property	2	0	0
On the same, if they elect to commute for tolls upon passengers, per mile.....	2	3	0
65. On all persons over ten years of age, per mile.....	0	0	5

STATEMENT

Of the Number, Class and Tonnage of Boats on the Canals on the 1st of January, 1844; also the Number, Class and Tonnage of Boats Built and Registered in each year subsequently, to and including 1860.

	Prior to Jan. 1, 1844.		1844.		1845.		1846.		1847.		1848.		1849.		1850.		1851.	
	No.	Tons.	No.	Tons.	No.	Tons.	No.	Tons.	No.	Tons.	No.	Tons.	No.	Tons.	No.	Tons.	No.	Tons.
250...
240...
220...
200...
180...
170...	1	170
150...	2	300	...
140...
135...
130...
125...	1	130
120...	1	125
115...	2	240
110...
105...
100...
95...
90...
85...
80...
75...
70...
65...
60...
55...
50...
45...
40...
35...
30...
25...
20...
15...
10...
5...
0...

CANAL COMMISSIONERS:

1701

[illegible]

[illegible]

N.B.—An allowance must, of course, be made for such boats as have gone out of use.	
Accurate accounts were made of the number of boats on the 1st of January, in the years 1847, 1855 and 1859, and resulted as follows:	
January 1, 1847, whole number of boats.....	2,725
January 1, 1855, do.....	3,401
January 1, 1859, do.....	3,867

TABLE

Exhibiting the date of the Opening and the Closing of the Hudson River, and the Number of Days Open; also the time of Commencement and Close of each Navigable Season of Canals, and the number of days of Navigation, since 1824; also the date of the opening of Lake Erie, since 1827.

Opening and closing of the Hudson river.		Commencement and close of navigation of Erie canal.			Opening of the lake.
River open.	River closed.	Open Days.	Canal open.	Canal closed.	
March 3, 1824.....	Jan. 5, 1824.....	309	April 30, 1824.....	December 4.....	219
March 6, 1825.....	Dec. 13, 1825.....	283	April 12, 1825.....	do 5.....	238
Febru'y 26, 1826.....	Dec. 24, 1826.....	302	April 20, 1826.....	do 18.....	243
March 20, 1827.....	Nov. 25, 1827.....	251	April 22, 1827.....	do 18.....	241
Febru'y 8, 1828.....	Dec. 23, 1828.....	220	Mar. 27, 1828.....	do 20.....	269
April 1, 1829.....	Jan. 14, 1829.....	286	May 2, 1829.....	do 17.....	230
March 15, 1830.....	Dec. 25, 1830.....	283	April 20, 1830.....	do 17.....	242
March 15, 1831.....	Dec. 6, 1831.....	263	April 16, 1831.....	do 1.....	230
March 25, 1832.....	Dec. 21, 1832.....	289	April 25, 1832.....	do 21.....	241
March 21, 1833.....	Dec. 13, 1833.....	277	April 19, 1833.....	do 12.....	238
Febru'y 29, 1834.....	Dec. 15, 1834.....	291	April 17, 1834.....	do 12.....	240
March 25, 1835.....	Nov. 30, 1835.....	268	April 15, 1835.....	November 30.....	230
April 4, 1836.....	Dec. 7, 1836.....	248	April 25, 1836.....	do 26.....	216
March 27, 1837.....	Dec. 14, 1837.....	261	April 20, 1837.....	December 9.....	234
March 19, 1838.....	Nov. 25, 1838.....	257	April 12, 1838.....	November 25.....	228
March 25, 1839.....	Dec. 18, 1839.....	286	April 20, 1839.....	December 16.....	241
Febru'y 25, 1840.....	Dec. 6, 1840.....	285	April 20, 1840.....	do 9.....	228
March 24, 1841.....	Dec. 19, 1841.....	286	April 24, 1841.....	November 30.....	221
Febru'y 4, 1842.....	Nov. 28, 1842.....	308	April 20, 1842.....	do 28.....	222
April 13, 1843.....	Dec. 10, 1843.....	242	May 1, 1843.....	do 30.....	214
March 18, 1844.....	Dec. 17, 1844.....	278	April 18, 1844.....	do 26.....	222
Febru'y 24, 1845.....	Dec. 3, 1845.....	283	April 16, 1845.....	do 29.....	228
March 18, 1846.....	Dec. 14, 1846.....	275	April 16, 1846.....	do 25.....	224
April 7, 1847.....	Dec. 25, 1847.....	263	May 1, 1847.....	November 30.....	214
March 22, 1848.....	Dec. 27, 1848.....	292	May 1, 1848.....	December 9.....	223
March 19, 1849.....	Dec. 26, 1849.....	286	May 1, 1849.....	do 5.....	219
					21, 1827. April 1, 1828. April 10, 1829. May 5, 1830. May 8, 1831. April 27, 1832. April 23, 1833. April 6, 1834. April 8, 1835. May 27, 1836. May 16, 1837. March 31, 1838. April 11, 1839. April 27, 1840. April 14, 1841. March 7, 1842. May 6, 1843. March 14, 1844. April 3, 1845. April 11, 1846. April 23, 1847. April 9, 1848. March 25, 1849.

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